Food and Agriculture Organization of the United Nations

FUNDING PROPOSAL TO THE GREEN CLIMATE FUND

– RELIVE –

REsilient LIVElihoods of vulnerable smallholder farmers in the Mayan landscapes and the Dry Corridor of Guatemala

ANNEX 3

ECONOMIC AND FINANCIAL ANALYSIS DESCRIPTION

FP V12 JUN20

Republic of Guatemala

April 2020

Table of Contents

1 Introduction

As fully described in the Feasibility Study, the proposed GCF project will overcome critical barriers to strengthen the resilience of vulnerable farmers against the impacts of climate change through the implementation of climate-resilient agricultural, water management and agroforestry practices, resulting in improved food and water security and more sustainable and resilient livelihoods. The aim of the project is to build the resilience of the most vulnerable farmers and their livelihoods to droughts and heatwaves, by supporting transformative agricultural practices, encouraging diversified incomes and strengthening local water resource management.

In Guatemala, around 76% of the rural population and 79% of the indigenous people live in poverty conditions.[1] Chronic malnutrition affects 53% of children in rural areas and 61% of children from indigenous origin. Poverty and food security are growing challenges in Guatemala, and this will be exacerbated by the effects of climate change, which represent a significant threat to agriculture. The majority of the population in the country are smallholder farmers engaged in rain-fed agriculture, which is highly sensitive to climate change. Infra-subsistence* and subsistence** family farmers are the most vulnerable population in Guatemala as they depend solely on agriculture for both food security and income generation. Guatemala is the second most vulnerable country to climate change in Latin America[2] and 11th worldwide[3] in terms of exposure and vulnerability. Historically, Guatemala has been a country with low water stress, however, at present, approximately 45% of the country experiences medium to high susceptibility to drought.[4] Climate change is expected to affect Guatemala's hydrological cycle, with scenarios showing an increase in normal climate variability, increasing the intensity of droughts and of dry years. The average annual temperature could increase between 2.5 and 4.1ºC by 2050.[5] Projections indicate a decrease in rainfall of up to 30% towards the end of the century. Recent regional climate models suggest that this will lead to an increase in the water deficit in dry regions of the country and substantial reductions in water availability in traditionally humid regions where the majority of subsistence agriculture is concentrated.[6]

Given the business-as-usual agricultural strategies in Guatemala, which provide top-down transfer of technological packages and focus closely on issues of crop productivity, the livelihoods and food security of farm families will be increasingly affected by climate-induced drought and heatwaves. Without a change in production practices, crop losses will be significant and rural livelihoods will be undermined. Achieving reduced vulnerability and increased resilience requires a shift in agricultural practices. Such practices will aim to improve soil humidity and introduce efficient irrigation systems and new seed varieties tolerant to droughts and heat waves to prevent the expected crop losses and help the country reach its target in terms of food security.

GCF funding will support agricultural transformation amongst the most vulnerable group of people: the small farmers who have limited access to markets, financial instruments, agricultural and climate technological advice and who suffer from poor basic infrastructure. The beneficiaries of the project will be infra-subsistence and subsistence smallholder farmers the majority of whom are indigenous people, who are the most exposed and vulnerable to the impacts of climate-induced droughts and heat waves. The project will directly support 130,000 people, of which over 45,500 will be women, in the Departments of Alta and Baja Verapaz, Petén, Zacapa and Chiquimula, who are vulnerable to climate hazards and impacts. In these

MAGA, 2016. Política Agropecuaria de Guatemala 2016 – 2020:

*Infra-subsistence family farmers – Majority are indigenous people living in poverty and extreme poverty, they do not produce enough for the family's consumption, they maintain a permanent risk of food and nutrition insecurity, which manifests itself in high chronic malnutrition, episodes of acute malnutrition; their access to productive resources and markets is low or null;

** Subsistence family farmers -Families in a situation of poverty, with limited land ownership, produce for self-consumption and exchange or sell locally a small part of their production, temporary workers are used outside their plot to supplement their basic needs. They produce the largest volume of food for national consumption, they influence the advance of the agricultural frontier.

[1] Pons, Brincker & Castellanos, 2018. *Asegurando la resiliencia ante el CC en los paisajes Mayas de Petén, Verapaces y el Corredor Seco. Producto 1. Documento de análisis de los efectos del Cambio climático a nivel nacional y local. Documento de consultoría.* Guatemala.

[2] Mapplecroft, 2014. *Indice de vulnerabilidad y adaptatción al cambio climático en la región de América Latina y Caribe.* Banco de Desarrollo de América Latina. Corporación Andina de Fomento.

[3] Eckstein, Künzel & Schäfer, 2018

[4] MARN, 2007. Programa de Acción Nacional de Lucha Contra la Desertificación y Sequía en Guatemala. Guatemala: MARN

[5] MARN, 2015

[6] Pons, Brincker & Castellanos, 2018. *Asegurando la resiliencia ante el CC en los paisajes Mayas de Petén, Verapaces y el Corredor Seco. Producto 1. Documento de análisis de los efectos del Cambio climático a nivel nacional y local. Documento de consultoría.* Guatemala.

areas, agriculture (mainly subsistence agriculture) is the main economic activity and the project focuses on the production systems for staple crops (maize and beans) and cash crops (coffee and cocoa).

The project will be implemented over seven years and generate three key outcomes:

- Critical production systems are climate resilient and farmers have enhanced, food-secured and adapted livelihoods;
- Water resources at micro-basin level are sustainably managed and landscapes are restored to ensure stable supply of water for farming amidst drought conditions;
- Local and national institutions adopt governance mechanisms and have strong capacities to implement climate change adaptation measures.

. The beneficiaries of the project will be infra-subsistence, subsistence and surplus smallholder farmers the majority of whom are indigenous people. Women will be 40% of the project beneficiaries considering their important role in rural agriculture. The gender assessment and the action plan (Cf. Annex 8) describe how all project activities have been designed considering the differing roles played and challenges faced by women and girls. Women's active participation during the implementation stages will be promoted to favor inclusion and promote their contribution to the sustainability of food systems and the use and management of natural resources.

The objectives of the project will be achieved through three interlinked components. The first component will target agricultural climate resilience actions at local level, the second component will ensure access to water resources and management at a landscape scale, and the third component will facilitate the necessary enabling conditions:

- Component 1. Implementing climate resilient agricultural practices and enhancing farmers' livelihoods: designed to promote resilience of agricultural producers at farm scale. It will improve the capacity of farmers to reduce drought-related agricultural impacts associated with climate change by using climate information and adopting adaptive management practices to build climate resilience in the agro-ecological systems of the target regions. This will include building capacity of farmers and extension service workers to access and use climate information that enables them to take decisions on periods for seed planting, varieties, use of agricultural inputs, soil and crop management, that adapt to climate variability. It will also entail the diversification of livelihoods to increase opportunities for additional income as a safety net in moment of water and food scarcity.

- Component 2. Promoting efficient water management for agriculture to reduce the impact of increased water scarcity: designed to strengthen smallholder farmers' capacities to better manage local water resources under conditions of increased water scarcity as a result of climate change. Community-led planning of water resource management at micro-basin level will guide the implementation of adaptation strategies to secure water resource in prolonged drought conditions and heat waves.

- Component 3. Strengthening of inter-institutional coordination and local governance for agricultural resilience and water management at local and national level: designed to strength the institutional capacities at all levels for comprehensive and climate risk-informed governance of water resources at a landscape level, by enabling inter-institutional platforms for coordination and enhancing knowledge management. These enabling factors will ensure the effective implementation of the activities under Components 1 and 2. This component is crucial to achieve replicability and upscaling of resilient agricultural practices at a landscape level and accomplish the expected paradigm shift.

This Annex describes the methodology, assumptions and results of the Economic and Financial Analyses of:

- Output 1.2: Adaptation measures adopted to foster the resilience of coffee, cocoa and basic grain production systems
- Output 1.3: Promotion of the resilience of livelihoods through productive diversification and market access

- Output 2.2: Landscapes are climate resilient and sustain critical ecosystems services for water availability in drought periods (only included in economic analysis)

2 Summary of Evaluated Outputs

2.1 Output 1.2.: Adaptation measures adopted to foster the resilience of coffee, cocoa and basic grain production systems

The project will promote practices that will reduce farmers' vulnerability to crop losses caused by periods of drought and heat waves. Activities will be focused on promoting the resilience of staple grain production (maize and beans), coffee and cacao to variability in levels and timing of rainfall and extreme temperatures. This will be achieved through the implementation of adaptation packages, which will bring together practices based on agroecological approaches. The proposed practices will be targeted and adjusted as necessary to reflect farm-specific, culturally-relevant and gender-responsive needs and priorities. In parallel, the project will design and implement an Evaluation System applied to agricultural production, and a land use / cover monitoring system to assess the impact of the project.

2.1.1 Adaptation package for basic crops (maize and beans)

The package includes the provision and use of drought-resilient varieties of maize and beans capable of withstanding the predicted reductions in rainfall levels and of avoiding crop damage in the case of unseasonal rains during the end of season harvest period. This will maintain or increase the productivity of the crops, even in unfavorable climatic conditions (droughts and prolonged heat waves) and contribute to food security. Additionally, the package promotes the adoption of practices at farm-level to improve organic matter and soil moisture retention capacity using agroecological approaches. It promotes agrobiodiversity in family gardens in order to create microclimate and help ensure stable yields for food security. Farmers will plant in their farms and home gardens fruit trees, timber trees and roots. A list with proposed species for planting is included in the Feasibility Study. It is expected to benefit 2,839 hectares with this adaptation package.

2.1.2 Adaptation package for coffee and cocoa production system

The package promotes the renewal of productive systems with improved varieties of cocoa tolerant to pests and coffee hybrids tolerant to rust and drought. The project will enable the gradual renewal of 1,808 ha of coffee and 1,548 ha of cocoa plantations with more resilient varieties. Additionally, the shade canopy will be diversified for greater resilience of coffee and cocoa planting.

2.1.3 Adaptation package for family gardens

It is expected to benefit 2,476 families with this adaptation package. The activities promoted with this package include planting fruit trees, timber trees and diversification with varieties of roots to promote food security and livelihood resilience.

Table 1. Summary of adaptation package

Adaptation package and activities	Adaptation results
Adaptation package for basic crops	
Generate portfolio and adopt climatically adapted seed varieties in collaboration with farmers and women's groups	- Reduced crop failure in the event of rainfall failure during critical growth periods - Reduced harvest failure in the event of excessive rainfall during harvest
Diversify adopting agrobiodiversity principles to create a favorable microclimate in the agriculture plot	- Maintenance of microclimate conditions, resulting in reduced loss of soil moisture - Improved infiltration of runoff, recharging soil moisture reserves and contributing to aquifer recharge and stream flow stabilization at landscape level. - Input of soil organic matter, resulting in increased soil moisture retention.
Improve organic matter content and soil moisture retention capacity through stubble management and elimination of slash and burn practice	- Increases in soil moisture reserves during unseasonal drought periods, associated with increased organic matter content - Reduced evaporative demand from crops - Maintenance of soil cover protects against temperature increases and resulting loss of soil moisture due to evaporation and decomposition of soil organic matter. - Reduction of soil disturbance and maintenance of cover reduces runoff and erosive losses during increasingly intense extreme rainfall events
Post-harvest handling of basic grains	- Improved and resilient storage facilities for basic grains to protect from extreme weather and preserve them for longer periods, thus contributing to food security.
Adaptation package for coffee and cocoa productive systems	
Establishment of improved coffee and cocoa hybrids tolerant to rust and drought	Improved drought-resilient variety of coffee and cocoa decreasing the impacts form prolonged droughts, pest, diseases and coffee rust
Adaptation and diversification of the structure of shade canopy for greater resilience to climate change	- Maintenance of microclimate conditions, resulting in reduced losses of soil moisture - Improved infiltration of runoff, recharging soil moisture reserves and contributing to aquifer recharge and stream flow stabilization at landscape level. - **Coffee:** Density, spatial arrangements and pruning techniques allow for greater aeration in the coffee plantation to counteract temperature increases, and the particular architecture of the coffee plants allows better ventilation into the interior plants, especially in times of heavy rain, so that diseases such as rust cannot thrive. - **Cocoa:** The shade provides protection to cocoa plants with strong winds. Also, the shade contributes to the recycling of nutrients, decrease in runoff (in the agroforestry system, runoff is 3% lower in comparison with full sun systems).[7] Finally, the arboreal component helps to create favorable microclimate conditions for the growth of the main crop and unfavorable for the development of diseases.
Management of the nutrient balance of the coffee agroforestry system	Maintaining a soil with the necessary nutrient stocks will help plants to be less vulnerable to attack by pests and diseases and more likely to withstand extreme weather events.
Management of coffee pests and diseases with emphasis on rust	Increased resilience of the coffee towards pests and diseases.

2.2 Output 1.3: Promotion of the resilience of livelihoods through productive diversification and market access

The project will promote alternative strategies for income generation to ensure that smallholder farmers have a safety net to avoid food insecurity. The activities will support vulnerable farmers and their households to generate additional income and enhance their resilience when there is a food gap due to losses in crop yield caused by droughts and high food prices. Stakeholder consultations at district, community and household levels identified a range of appropriate and desired interventions for resilience building and climate change adaptation measures to create sustainable community assets and

[7] Cerda, R. D. (2014). Contribution of cocoa agroforestry systems to family income and domestic consumption: looking toward intensification. *Agroforestry Systems, 88*(6), 957-981. doi:10.1007/s10457-014-9691-8

investments. Key diversification strategies will support climate-resilient value chain development for cocoa and coffee, diversification with family gardens and poultry, enhancement of business skills for better access to the market. The small-scale vegetable production and poultry to ensure greater dietary diversity will provide women with income-generating opportunities. In cases of failure of one crop during dry period or due to pests, the farmers will have other crops as a safety net. The project will collaborate with the Government of Guatemala to link its nationally funded school meals program with local producers and help catalyze the creation of a market for communities and stimulate local production and purchase. This output aims to leverage work already carried out under the FAO project implemented in the region of Chiquimula.

2.2.1 Strengthen the resilience of livelihoods through the recovery of the value chains of cocoa production systems

This practice complements the actions developed to increase the resilience of cocoa farms through renovation / establishment of agroforestry systems. Currently, farmers are not organized to sale cocoa collectively, nor to add value to the product. Due to the barriers they face, farmers do not have access to financial resources to implement infrastructure to add value to cocoa and to get training. Instead, the sale cocoa as a commodity and receive low prices. Through this practice, beneficiaries will receive support to enhance their organizations, capacity building and training in adding value to cocoa, technical assistance, construction of infrastructure to provide added value and access to markets, among others. The project will support the implementation of one operational center to add value to cocoa.

2.2.2 Strengthen the resilience of livelihoods through the recovery of the value chains of coffee production systems

This practice is fundamental to give sustainability to actions related to increasing the resilience of coffee producers through the establishment or renewal of agroforestry systems, with innovations in the diversification and structure of the system, and with agroforestry management, adapted to the climatic conditions and risks foreseen for the region. As in the case of cocoa, small coffee producers are not organized to sell their production and do not have the economic and technical resources to process their coffee and give it an added value, hence they have to sell it to intermediaries at low prices. Through this practice, beneficiaries will receive support to enhance their organizations, capacity building and training in adding value to coffee, technical assistance, construction of infrastructure to provide added value and access to markets, among others. The project will support the implementation of two operational centers to add value to coffee.

2.3 Output 2.2: Landscapes are climate resilient and sustain critical ecosystems services for water availability in drought periods

The activities under this output will focus on landscape restoration as a climate change adaptation strategy targeted towards increasing forest cover, improving the hydrological cycle, increasing the amount of available water, and regulating surface and groundwater flows, while maintaining and improving water supply and quality. The project landscape approach will ensure that land degradation is reduced, and that productivity is maintained and made resilient to climate change impacts. The micro-basin water management plans will inform the planning of reforestation activities by prioritizing the key areas with high potential for restoring the hydrological cycle.

The project will deliver this output through the forest incentive programs PINPEP and PROBOSQUE, earmarked by INAB. The project focuses on promoting agroforestry systems in addition to protection and forest management activities which are usually performed under PINPEP and PROBOSQUE. As agroforestry systems is a relatively new practice for INAB under PINPEP and PROBOSQUE, technical expertise is limited which hinders the progress of the process. It is expected to benefit 13,044 hectares with landscape restoration to promote hydrological cycle and prevent erosion.

3 Financial analysis

The financial analysis estimates the increase in net incremental income as a result of investments in adaptation package to transform agriculture into systems resilient to climate change in family farmers. Methods of project evaluation are applied to determine the expected benefits of its implementation. For this, it is compared the situation that family farmers would have in a scenario *without project* (business as usual), with the future scenario *with project*, i.e., the adoption of the agro-ecological systems adapted to climate change proposed by the project.

For defining the financial benefits obtained by implementing the climate-resilient production models, the Marginal Productivity Method is used. This method consists of estimating the Net Present Value of the highest agricultural production given the improved productive capacity of agro-ecological systems as a result of the investments in the models.

$$y_j = f(PC, X)$$

Where:
y_j= yield per hectare of crop j
PC= Productive capacity given by the agro-ecological system per hectare
X= Matrix of others productive factors per hectare (labor, capital, etc.)

The method is based on the principle that family farmers maximize their profits by using the productive capacity of their agro-ecological system (as well as any other productive input) to the extent that the marginal net income generated by using the agro-ecological system is equal to the marginal cost of obtaining that additional unit.

The method is also based on the principle of the limiting factor, which states that the production ceiling is determined by the productive input that is available at the lowest level that prevents the increase of yields, regardless of whether the other productive inputs are available at levels that would increase production.

Therefore, the greater availability of productive capacity given by the agro-ecological system *a with project* scenario allows farmers to increase their agricultural production compared to the scenario *without project*. The financial benefit is, therefore, the difference of the net income between the scenario *with project* and the scenario *without project*:

$$FBA = \sum_{j}^{n} (p_j * q_j^{wp} - C^{wp}) * ha_j - \sum_{j}^{n} p_j * q_j^{np} - C^{np} * ha_j$$

Where:
BER= Financial benefit in agriculture
P_j= output price of crop j
q_j^{wp} = yield per hectare of crop j in a *with project* scenario
C^{wp}= cost per hectare in *with project* scenario
ha_j = hectares of crop j
q_j^{np} = yield per hectare of crop j in a *without project* scenario
C^{np}= cost per hectare in *without project* scenario

This method assumes *ceteris paribus*, meaning that all other factors affecting agricultural production systems remains constant. Although in practice there is a dynamic behavior of family farmers in the management of productive systems in terms of practices, use of inputs, destination of production and technological advances, among others, it is considered that in the scenario *with project* these variables remain fixed. Therefore, the differential of financial benefits is directly related to the productive increase that is generated by the greater productive capacity of agro-ecological systems adopted by family farmers.

Both cost and benefits are estimated considering market prices of inputs and outputs. A 20-year horizon is considered given the type of investments, as it reflects full revenue stream.

The assumptions considered for the financial analysis are as follows:

- Financial discount rate: 12%
- Evaluation horizon: 10 and 20 years
- Gradual inclusion in seven stages in all adaptation packages: 33% of hectares are incorporated into the project at year 1 of implementation, 15% at year 2, 14% at year 3, 14% at year 4, 12% at year 5, 8% at year 6, and 4% at year 7. This means that full incorporation is completed after 7 years).

Table 2. Hectares (modules in case of family gardens) incorporated into the project by adaptation package.

Adaptation Package	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
Basic crops (corn and bean)	989	370	370	370	370	370	0	2839
Coffee	308	300	300	300	300	150	150	1808
Cocoa	937	250	200	161	0	0	0	1548
Family gardens	626	370	370	370	370	185	185	2476
Subtotal	2860	1290	1240	1201	1040	705	335	8671
Proportion	33%	15%	14%	14%	12%	8%	4%	100%

This methodology is applied to estimate the financial behavior for each adaptation package. The financial description of categories is presented in next section.

3.1 Adaptation package for basic crops (maize and beans)

This section describes the main characteristics of each adaptation package: description of producers and proposed practices, cash flows and financial benefits for the with project scenario and without project scenario, considering the proposed project lifespan (20 years)[8]. Investment and maintenance cost with and without project, yields and input demand with and without project, price of products, inputs and investments are presented for each category in the Appendix.

For this adaptation package, in the without project scenario, a reduction compared to the baseline of 8% and 10% of yields for beans and corn, respectively, is expected due to climate variability and extreme weather events (reductions in water availability between and rising of temperatures) during the lifetime of the project[9].

In the scenario with project, an increase in yields of 28% for bean and 40% for corn is expected compared to the baseline as a result of the implementation of the adaptation package promoted by the project, which will be reached linearly by year 10[10]. For years 11 to 20, year 10 yields are expected to be maintained for corn and bean. This adaptation package includes the incorporation of nance, jocote, firewood and forest products[11].

Table 3. Yields assumptions of Adaptation package for basic crops

Crop	Yield Baseline	Expected yield without project (by 20 years)	Expected yield with project (by 20 years)
Beans (ton/ha)	0.82	0.75	1.05
Maize (ton/ha)	1.6	1.44	2.24
Nance (kg/ha)	-		50
Jocote (thousand/ha)	-		3.75
Firewood (m3 st/ha)	-		2
Wood (tree/ha)	-		2

The net present value of without project scenario is estimated in US$239 per hectare, that is equivalent to an annual payment of US$32 per year per hectare during 20 years. The net present value with project scenario is estimated in US$1,175 per hectare, with an annual payment of US$157 per year per hectare during 20 years. The incremental net present value is estimated in US$936 per hectare, with an equivalent annual payment of US$125 per year per hectare during 20 years. The financial internal rate of return is 22.4%.

[8] For a detailed description of adaptation packages, please refer to Feasibility Study.

[9] Information from ECLAC (2018) and Schmidt et al. (2012) show that in the areas prioritized by RELIVE, the reductions in corn and bean yields can reach up to 32.7% (for corn) and 33.2% (for beans). However, to avoid overestimations of revenues, for the present analysis, the values of 8 and 10% presented above were used.
Sources: Schmidt, A., Eitzinger, A., Sonder, K., & Sain, G. (2012). Tortillas on the Roaster: Central American Maize-Bean systems and the changing climate. ECLAC. 2018, La economía del cambio climático en Guatemala-Documento técnico 2018, LC/MEX/TS.2018/13, Ciudad de México

[10] This assumption is based on the yields observed in the proposed varieties ICTA B15 ACP + Zn (for the case of Corn) and ICTA CHORTI ACM (for the case of beans). These varieties may have up to 55% more of the yield used in the present work, but given that the small farmers participating in the project own lands with poor soils, a consultation was made to the CATIE experts to establish if RELIVE could reach these yields. These experts explained that the varieties proposed are designed for this kind of land. Still, in order not to overestimate incomes in the financial analysis, we decided to use the values presented in the text.

[11] Nance, jocote, firewood, and forest products are included in the financial analysis. These products were included based on other experiences developed in Alta and Baja Verapaz, and Chiquimula.

Table 4. Yields, flows and financial indicators per hectare for the without and with project scenario of Adaptation package for basic crops

Adaptation Package 1: basic crops											
Year	Without project			With project							Incremental Cash flux (US$/ha)
	Yield per hectare		Cash flow (US$/ha)	Yield per hectare						Cash flow (US$/ha)	
	Corn (ton)	Bean (ton)		Bean (ton)	Corn (ton)	Nace (kg)	Jocote (thousand)	Firewood (m3 st)	Wood (tree)		
1	1.60	0.82	46.2	0.84	1.70	0	0.00	0.00	0.00	-697	-743
2	1.59	0.82	69.2	0.85	1.74	0	0.00	0.00	0.00	70	0
3	1.58	0.81	37.1	0.87	1.80	0	0.00	0.00	0.00	59	21
4	1.57	0.81	60.1	0.97	1.86	0	0.00	0.00	0.00	158	98
5	1.57	0.81	28.1	0.92	2.10	0	0.00	2.00	0.00	116	88
6	1.56	0.80	51.1	0.95	1.98	50	3.75	2.00	0.00	244	193
7	1.55	0.80	19.0	0.97	2.04	50	3.75	2.00	0.00	232	213
8	1.54	0.80	42.0	1.00	2.10	50	3.75	2.00	0.00	331	289
9	1.53	0.79	10.0	1.02	2.16	50	3.75	2.00	1.00	275	265
10	1.52	0.79	33.0	1.05	2.24	50	3.75	2.00	1.00	478	445
11	1.52	0.79	0.9	1.05	2.22	50	3.75	2.00	1.00	414	413
12	1.51	0.78	23.9	1.05	2.22	50	3.75	2.00	1.00	506	482
13	1.50	0.78	-8.2	1.05	2.22	50	3.75	2.00	1.00	414	422
14	1.49	0.78	14.8	1.05	2.22	50	3.75	2.00	1.00	520	506
15	1.48	0.77	-17.2	1.05	2.24	50	3.75	2.00	2.00	533	551
16	1.47	0.77	5.8	1.05	2.22	50	3.75	2.00	2.00	602	596
17	1.47	0.76	-23.8	1.05	2.22	50	3.75	2.00	2.00	503	526
18	1.46	0.76	-3.3	1.05	2.22	50	3.75	2.00	2.00	602	605
19	1.45	0.76	-32.9	1.05	2.22	50	3.75	2.00	2.00	547	579
20	1.44	0.75	-12.3	1.05	2.24	50	3.75	2.00	2.00	559	572
Net Present Value (US$/ha)	$ 239			$ 1,175							$ 936
Equivalent Annual Payment (US$/ha)	$ 32			$ 157							$ 125

3.2 Adaptation package for cocoa

For this adaptation package, in the without project scenario, a reduction compared to the baseline of 26% for cocoa, and 23% for others products (banana, orange, mango, forest products and firewood[12]) is expected due to climate variability and extreme weather events (reduction in water availability and increase in temperatures) during the lifespan of the project.

In the scenario with project, as a result of the implementation of the new varieties and adaptation measures promoted by the project, an increase in yields of 140% and 650% for cocoa[13] and banana, respectively is expected. For oranges, an increase in yields of 100% compared to the baseline is expected. Mango yield is expected to increase in 300% compared to the baseline.

Table 5. Yields assumptions of Adaptation package for cocoa

Crop	Yield Baseline	Expected yield without project (by 20 years)	Expected yield with project (by 20 years)
Cocoa (kg/ha)	250	186	600
Banana (heads/ha)	20	15	150
Orange (units/ha)	2000	1548	4000
Mango (units/ha	500	387	2000
Firewood (m3 st/ha)	2	1.6	2
Timber (trees/ha)	1	0.8	3

The net present value of the without project scenario is estimated in US$1,900 per hectare, that is equivalent to an annual payment of US$254 per year per hectare during 20 years. The net present value with project scenario is estimated in US$3227 per hectare, with an annual payment of US$432 per year per hectare during 20 years. The incremental net present value is estimated in US$1,327, with an equivalent annual payment of US$178 per year per hectare during 20 years. The financial internal rate of return is 18.6%.

***Table 6. Yields, flows and financial indicators per hectare for the without and with project scenario of Adaptation* Package for Cocoa**

Adaptation Package 2: cocoa															
Year	Without project							With project							Incremental Cash flow (US$/ha)
	Yield per hectare						Cash flow (US$/ha)	Yield per hectare						Cash flow (US$/ha)	
	Cacao (kg)	Banana (head)	Orange (units)	Mango (units)	Wood (tree)	Firewood (m3 st)		Cacao (kg)	Banana (head)	Orange (units)	Mango (units)	Wood (tree)	Firewood (m3 st)		
1	250	20	2000	500	1.0	2.0	345	200	50	2000	500	1.0	2.0	-575	-920
2	241	19	1900	475	1.0	1.9	321	188	200	2000	500	1.0	2.0	-270	-591
3	231	18	1805	451	0.9	1.8	290	188	300	2000	500	1.0	2.0	-229	-519
4	222	17	1715	429	0.9	1.7	268	263	150	2000	500	1.0	2.0	-411	-679
5	213	16	1629	407	0.8	1.6	238	338	150	3000	1000	1.0	2.0	428	190
6	211	15	1548	387	0.8	1.5	229	450	150	4000	2000	1.0	2.0	816	587
7	209	15	1548	387	0.8	1.5	222	600	150	4000	2000	1.0	2.0	1106	884
8	207	15	1548	387	0.8	1.5	223	600	150	4000	2000	1.0	2.0	1110	887
9	206	15	1548	387	0.8	1.5	216	570	150	3800	1900	1.0	2.0	999	782
10	204	15	1548	387	0.8	1.5	218	600	150	4000	2000	1.0	2.0	1110	893
11	202	15	1548	387	0.8	1.5	211	570	150	3800	1900	1.0	2.0	1031	820
12	200	15	1548	387	0.8	1.5	212	600	150	4000	2000	1.0	2.0	1110	898
13	199	15	1548	387	0.8	1.5	205	570	150	3800	1900	1.0	2.0	999	794
14	197	15	1548	387	0.8	1.5	207	600	150	4000	2000	1.0	2.0	1110	904
15	195	15	1548	387	0.8	1.5	200	570	150	3800	1900	3.0	2.0	1179	979
16	193	15	1548	387	0.8	1.5	201	600	150	4000	2000	3.0	2.0	1258	1057
17	192	15	1548	387	0.8	1.5	194	570	150	3800	1900	3.0	2.0	1147	953
18	190	15	1548	387	0.8	1.5	195	600	150	4000	2000	3.0	2.0	1258	1063
19	188	15	1548	387	0.8	1.5	189	570	150	3800	1900	3.0	2.0	1179	991
20	186	15	1548	387	0.8	1.5	190	600	150	4000	2000	3.0	2.0	1258	1069
Net Present Value (US$/ha)	1900							3227							1327
Equivalent Annual Payment (US$/ha)	254							432							178

[12] Banana, orange, mango, forest products, and firewood are included in the financial analysis. These products were included based on other experiences developed in Alta Verapaz. The assumption related to the reduction in yields was based on CATIE´s expert recommendation. This recommendation was based not just on their experience but also on other sources such as Flood, J., & Gilmour, M. (2017), Muñoz et al. (2017), and Medina & Lliberte (2017) and Bun et al. (2019). It is worth to mention that the yields used for the estimations of the economic analysis are conservative to avoid overestimations.
Sources: Flood, J. &. (2017). The potential effects of climate change on cacao pest and diseases. Paper presented at the Indonesian International Cacao Symposium, Jakarta, Indonesia. Indonesia. Medina, V., & Laliberte, B. (2017). A review of research on the effects of drought and temperature stress and increased CO2 on Theobroma cacao L., and the role of genetic diversity to address climate change. Muñoz, L., Tixier, P., Germon, A., Rakotobe, V., Phillips-Mora, W., Maximova, S., & Avelino, J. (2017). Effects of microclimatic variables on the symptoms and signs onset of Moniliophthora roreri, causal agent of Moniliophthora pod rot in cacao. PLoS One, 12(10), e0184638. doi:10.1371/journal.pone.0184638.

[13] According to Phillips et al. (2012), cocoa clones have the potential to produce more than 2000 kg/ha. Given the changes in climate conditions, a conservative approach of a maximum production of 600 kg/ha/kg is assumed.

3.3 Adaptation package for coffee

For this adaptation package, in the without project scenario, it is expected a reduction in yields compared to the baseline of 22% for coffee, and 20% for banana, orange, mango, forest products and firewood, during the lifespan of the project[14].

In the scenario with project, as a result of the implementation of the adaptation measures promoted by the project, an increase in yields of 64% for coffee and 50% for banana compared to the baseline. In the case of orange, is expected an increase in 33% of yield compare to the baseline, and 300% for mango. No change in yield is expected to firewood.

Table 7. Yields assumptions of Adaptation package for coffee

Crop	Yield Baseline	Expected yield without project (by 20 years)	Expected yield with project (by 20 years)
Coffee (kg/ha)	3571	2768	5844
Banana (heads/ha)	100	80	150
Orange (units/ha)	3000	2400	4000
Mango (units/ha	500	400	2000
Timber (tree/ha)	0.5	0.4	3
Firewood (m3 st/ha)	2	1.6	2

The net present value of without project scenario is estimated in US$5,420 per hectare, that is equivalent to an annual payment of US$725 per year per hectare during 20 years. The net present value with project scenario is estimated in US$6,375 per hectare, with an annual payment of US$853 per year per hectare during 20 years. The incremental net present value is estimated in US$954 per hectare, with an equivalent annual payment of US$127 per year per hectare during 20 years. The financial internal rate of return is 15.2%.

Table 8. Yields, flows and financial indicators per hectare for the without and with project scenario of Adaptation Package for Coffee

Adaptation Package 3: Coffee															
Year	Without project							With project							Flujo de caja incremental (US$/ha)
	Yield per hectare						Cash flow (US$/ha)	Yield per hectare						Cash flow (US$/ha)	
	Coffee (kg cherry)	Banana (head)	Orange (units)	Mango (units)	Wood (tree)	Firewood (m3 st)		Coffee (kg cherry)	Banana (head)	Orange (units)	Mango (units)	Wood (tree)	Firewood (m3 st)		
1	3571	100	3000	500	0.5	2.0	941	1948	50	2000	500	1	2	-627	-1567
2	3437	95	2850	475	0.5	1.9	884	1948	200	2000	500	1	2	-326	-1210
3	3303	90	2700	450	0.5	1.8	793	2532	300	2000	500	1	2	-22	-815
4	3169	85	2550	425	0.4	1.7	736	3506	150	2000	500	1	2	-90	-826
5	3035	80	2400	400	0.4	1.6	645	3896	150	3000	1000	1	2	1090	445
6	3017	80	2400	400	0.4	1.6	660	4870	150	4000	2000	1	2	1549	889
7	3000	80	2400	400	0.4	1.6	641	5844	150	4000	2000	1	2	1828	1188
8	2982	80	2400	400	0.4	1.6	656	5844	150	4000	2000	1	2	1832	1177
9	2964	80	2400	400	0.4	1.6	636	5260	150	3600	1800	1	2	1506	870
10	2946	80	2400	400	0.4	1.6	651	5844	150	4000	2000	1	2	1832	1181
11	2928	80	2400	400	0.4	1.6	632	5260	150	3600	1800	1	2	1538	907
12	2910	80	2400	400	0.4	1.6	647	5844	150	4000	2000	1	2	1832	1186
13	2893	80	2400	400	0.4	1.6	627	5260	150	3600	1800	1	2	1506	879
14	2875	80	2400	400	0.4	1.6	642	5844	150	4000	2000	1	2	1832	1190
15	2857	80	2400	400	0.4	1.6	622	5260	150	3600	1800	3	2	1686	1064
16	2839	80	2400	400	0.4	1.6	638	5844	150	4000	2000	3	2	1981	1343
17	2821	80	2400	400	0.4	1.6	618	5260	150	3600	1800	3	2	1654	1036
18	2803	80	2400	400	0.4	1.6	633	5844	150	4000	2000	3	2	1981	1348
19	2785	80	2400	400	0.4	1.6	613	5260	150	3600	1800	3	2	1686	1073
20	2768	80	2400	400	0.4	1.6	628	5844	150	4000	2000	3	2	1981	1352
Net Present Value(US$/ha)	$ 5,420.7							$ 6,375.2							$ 954.5
Annual equivalent payment(US$/ha)	$ 725.7							$ 853.5							$ 127.8

[14] This assumption is based on a consultancy that CATIE and Del Valle University developed to determine the impacts of climate change in the RELIVE project area and to suggest the adaptation measures to promote resilience in the region. This work indicates that climate change will have a direct impact on the: 1) increase of pests and diseases (such as coffee rust), 2) water availability, and 3) the increases in temperature, which will have a direct impact on coffee yields. The reduction in yields can reach up to 25%, but to avoid overestimations, the value used in this document was 20%. It is worth mentioning that this assumption is no just based on the experience of the CATIE researchers who developed the study, as is the case of Cerda et al (2017), but also in other sources such as ECLAC (2014), Haggar et al (2011), Filho and Astorga (2015), Avelino et al (2015).
Sources: Avelino, J. C. (2015). The coffee rust crises in Colombia and Central America (2008–2013): impacts, plausible causes and proposed solutions. Food Security, 7(2), 303-321. doi:10.1007/s12571-015-0446-9. ECLAC. 2014. Impactos potenciales del cambio climático sobre el café en Centroamérica. México, D.F. : ECLAC. Filho, V., & Astorga, M. (2015). Prevención y control de la roya del café: Manual de buenas prácticas para técnicos y facilitadores. Turrialba, Costa Rica. CATIE. Haggar, J., Barrios, M., Bolaños, M., Merlo, M., Moraga, P., Munguia, R., . . . Staver, C. (2011). Coffee agroecosystem performance under full sun, shade, conventional and organic management regimes in Central America. Agroforestry Systems (82), 285-301.

3.4 Adaptation package for family gardens

For this adaptation package, in the without project scenario, a reduction in yields of 10% for all products: cabbage, lettuce, carrot, onion, sweet pepper, and tomato compared to the baseline is expected during the lifespan of the project[15].

In the scenario with project, as a result of the implementation of the adaptation measures promoted by the project, these products will maintain the current yield, and new products will be included: chayote (pumpkin), Maracuya (passion fruit), eggs, chickens, mango, oranges and avocado[16].

Table 9. Yields assumptions of Adaptation package for family gardens

Crop	Yield Baseline	Expected yield without project (by 20 years)	Expected yield with project (by 20 years)
Cabbage (kg/ha)	60	54	60
Lettuce (lb./ha)	80	72	80
Carrot (lb./ha)	100	90	100
Onion (lb./ha	120	108	120
Sweet pepper (lb./ha)	240	217	240
Tomato (lb./ha)	320	289	320
Chayote (units/ha)	-	-	80
Passion Fruit (units/ha)	-	-	120
Eggs (units/ha)	-	-	1022
Birds for sale (units/ha)	-	-	2
Mango (units/ha)	-	-	480
Orange (units/ha)	-	-	500
Avocado (units/ha)	-	-	240

The net present value of *without project* scenario is estimated in US$988 per hectare that is equivalent to an annual payment of US$132 per year per hectare per hectare during 20 years. The net present value of the *with project* scenario is estimated in US$1,096 per hectare, with an annual payment of US$147 per year per hectare during 20 years. The incremental net present value is estimated in US$108, with an equivalent annual payment of US$14 per year during 20 years. The financial internal rate of return is 16.3%.

[15] Given that there is no information regarding the influence of climate change in the reduction of cabbage, lettuce, carrot, onion, sweet pepper, and tomato yields, CATIE made a consultation among their experts in family agriculture, and they concluded that for this case yield reductions could reach up to 15%. To avoid overestimations, a value of 10% was used.

[16] The assumption that yields remain constant and the inclusion of new products was based on the suggestion of CATIE experts in family agriculture that have been working in Guatemala and other countries of Central America.

Table 10. Yields, and financial indicators for the without and with project scenario of Adaptation package Family gardens

Year	Adaptation package 4: Family gardens																					Incremental Cash flow (US$/ha)
	Without project							With project														
	Yield per 1.000 m2						Cash flow (US$/ha)	Yield per 1.000 m2													Cash flow (US$/ha)	
	Cabbage (kg)	Lettuce(lb.)	Carrot (lb.)	Onion (lb.)	Sweet pepper(lb.)	Tomato (lb.)		Cabbage (kg)	Lettuce(lb.)	Carrot (lb.)	Onion (lb.)	Sweet pepper(lb.)	Tomato (lb.)	Chayote (unit)	Passion Fruit (unit)	Eggs (unit)	Gens (unit)	Mango (unit)	Orange (unit)	Avocado (unit)		
1	60	80	100	120	240	320	87	60	80	100	120	240	320	80	120	1022	2	0	0	0	-132	-218
2	60	80	99	119	239	318	150	60	80	100	120	240	320	120	160	1022	2	0	0	0	147	-2
3	59	79	99	119	237	317	148	60	80	100	120	240	320	120	160	1022	2	0	0	0	131	-16
4	59	79	98	118	236	315	146	60	80	100	120	240	320	80	120	1022	2	0	0	0	121	-24
5	59	78	98	117	235	313	144	60	80	100	120	240	320	120	160	1022	2	80	100	80	154	10
6	58	78	97	117	234	312	142	60	80	100	120	240	320	120	160	1022	2	120	200	160	177	35
7	58	77	97	116	232	310	140	60	80	100	120	240	320	120	160	1022	2	200	280	240	194	54
8	58	77	96	116	231	308	138	60	80	100	120	240	320	80	120	1022	2	320	400	240	207	69
9	58	77	96	115	230	307	136	60	80	100	120	240	320	120	160	1022	2	400	500	240	226	90
10	57	76	95	114	229	305	134	60	80	100	120	240	320	120	160	1022	2	480	500	240	236	102
11	57	76	95	114	228	303	132	60	80	100	120	240	320	120	160	1022	2	480	500	240	229	97
12	57	75	94	113	226	302	131	60	80	100	120	240	320	80	120	1022	2	480	500	240	226	96
13	56	75	94	113	225	300	129	60	80	100	120	240	320	120	160	1022	2	480	500	240	234	105
14	56	75	93	112	224	299	127	60	80	100	120	240	320	120	160	1022	2	480	500	240	236	109
15	56	74	93	111	223	297	125	60	80	100	120	240	320	120	160	1022	2	480	500	240	229	104
16	55	74	92	111	222	295	123	60	80	100	120	240	320	80	120	1022	2	480	500	240	226	103
17	55	73	92	110	220	294	121	60	80	100	120	240	320	120	160	1022	2	480	500	240	234	113
18	55	73	91	110	219	292	120	60	80	100	120	240	320	120	160	1022	2	480	500	240	236	116
19	55	73	91	109	218	291	118	60	80	100	120	240	320	120	160	1022	2	480	500	240	229	111
20	54	72	90	108	217	289	116	60	80	100	120	240	320	80	120	1022	2	480	500	240	226	110
Net Present Value (US$/ha)	$ 988							$ 1,096														$ 108
Equivalent Annual Payment (US$/ha)	$ 132							$ 147														$ 14

3.5 Enhancement of the value chain of coffee production systems

All the activities included in the promotion of value chain of coffee (investment in a two operational center to add value of coffee, enhancement of farmer organization, capacity building, technical training, among others) will support the resilience of vulnerable farmers to climate change. Each center will benefit 1,000 vulnerable coffee farmers. Each center is designed to process production of 1000 manzanas (700 hectares), with yield of coffee pergamino that starts in0.38 TM/ha, and achieve 1.13 MT/ha at year 7 due to investments, capacity building and technical training.

A center with all investment and operation and maintenance costs considering 20 years of project lifespan was designed. Technical assistance includes environmental impact studies of the center, training in organizational capacities, and business development. It also includes quality control equipment for coffee, and also a warehouse, and a coffee processing facilities[17]".

The net present value for each operational center to add value to coffee is US$23,471, with an internal rate of return of 12.6%. This is equivalent to an annual payment of US$3,142 per year during 20 years, meaning USD$3 per family per year.

Table 11. Flow of income and cost of an operational center to add value to coffee.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Costs USD																				
Technical assistance	28,571	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584
Equipment and administrative expenses	45,349	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265
Warehouse and office	11,688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costs of wet processing	739,506	270,674	351,877	487,214	541,349	676,686	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023	812,023
Total Cost USD	$825,114	$306,523	$387,726	$523,063	$577,198	$712,535	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872	$847,872
Income USD																				
Yield (qq/mz)	2.64	2.64	3.43	4.75	5.28	6.60	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92	7.92
Area (mz)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price (USD/qq)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Total Income USD	$317,134	$317,134	$412,275	$570,842	$634,269	$792,836	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403	$951,403
Net Income USD	-$507,980	$10,611	$24,549	$47,779	$57,071	$80,301	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531	$103,531
NPV USD	**$23,471**																			
TIR	**12.6%**																			
Equivalent Annual Payment USD	**$3,142**																			

[17] This includes collection centers, fermentation area, solar dryers and offices.

3.6 Enhancement of the value chain of cocoa production systems

All the activities included in the promotion of the cocoa value chain (investment in an operational center to add value, enhancement of farmers organization, capacity building, technical training, among others) will support the resilience of vulnerable farmers to climate change. This center will benefit 1,500 vulnerable cocoa farmers. The center is designed to process production of 750 hectares of cocoa.

A center with all investment and operation and maintenance costs considering 20 years of project lifespan was designed. Technical assistance includes environmental impact studies of the center, training organizational capacities and business development. Equipment and administrative expenses includes vehicles, fuel, maintenance services, and quality control equipment for coffee, facilities, furniture and administrative staff.

The net present value for an operational center to add value to cocoa is US$183,858, with an internal rate of return of 20.4%. This is equivalent to an annual payment of US$24,578 per year during 20 years, meaning USD$16 per family per year.

Table 12. Flow of income and cost of an operational center to add value to coffee.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Costs (USD)																				
Fermentation, drying, and packing	3,008	1,830	3,341	2,018	2,118	3,467	2,336	2,452	3,818	2,704	2,839	4,224	3,130	3,286	4,693	3,623	3,804	5,237	4,194	4,404
Fermentation area	180,192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar dryer	227,674	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment and administrative expenses	45,349	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265	20,265
Warehouse and office	11,688	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Technical assistance	28,571	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584	15,584
Raw cocoa	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565	45,565
Total Cost USD	542,047	83,244	84,755	83,432	83,533	84,881	83,750	83,867	85,232	84,118	84,253	85,638	84,544	84,701	86,108	85,037	85,219	86,652	85,609	85,818

Income USD	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Number of fermentation cages	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Fermentation cages yield	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Price (100 pounds)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total Income USD	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636	163,636

Net Income USD	-378,411	80,392	78,881	80,205	80,104	78,755	79,887	79,770	78,404	79,518	79,383	77,999	79,092	78,936	77,529	78,599	78,418	76,985	78,028	77,818

NPV USD	**$183,585**
IRR	**20.4%**
Equivalent Annual Payment USD	**$24,578**

3.7 Summary of financial results

As a complement, a financial analysis was performed to evaluate the results of four adaptation packages in a midterm horizon: 10 years.

The results show that only Basic Crops presents a positive incremental net present value in a midterm analysis of 10 years horizon. If it the project lifespan is considered (20 years) all adaptation packages generates financial benefits to rural families that are higher than costs. The explanation of this situation is that adaptation packages presents incremental negative cash flows during first 4 years for cocoa, coffee and family gardens, but from then on cash flows are in all cases significantly superior to the without-adaptation option. This result is not unexpected since the benefits of the restoration of degraded landscape will be evident at a longer time period[18].

Table 13. Financial indicators per adaptation package and for operational center to add value

Adaptation Package	Without project		With project		Net effect		
	NPV (US$/ha)	Equivalent Annual Payment (US$/ha)	NPV (US$/ha)	Equivalent Annual Payment (US$/ha)	NPV (US$/ha)	Internal Rate of Return	Incremental Equivalent Annual Payment(US$/ha)
	10 years horizon						
Basic Crops	$ 243	$ 43.0	$ 256	$ 45.4	$ 14	12.4%	$ 2.4
Coffe	$ 4,272	$ 756.0	$ 3,212	$ 568.4	-$ 1,060	4.8%	-$ 187.6
Cocoa	$ 1,531	$ 270.9	$ 1,170.35	$ 207.1	-$ 360	8.3%	-$ 63.8
Family gardens	$ 759.39	$ 134.4	$ 676.63	$ 119.8	-$ 83	4.7%	-$ 14.6
	20 Years horizon						
Basic Crops	$ 239	$ 32.00	$ 1,175	$ 157.32	$ 936	22.4%	$ 125.32
Coffee	$ 5,421	$ 725.71	$ 6,375	$ 853.50	$ 954	15.2%	$ 127.79
Cocoa	$ 1,900	$ 254.32	$ 3,227	$ 431.97	$ 1,327	18.6%	$ 177.65
Family gardens	$ 988	$ 132.31	$ 1,096	$ 146.73	$ 108	16.3%	$ 14.42
Operational center to add value to coffee	-	-	-	-	$183,585	20.4%	$24,578
Operational center to add value to cocoa	-	-	-	-	$23,471	12.6%	$3,142

The support of the Green Climate Fund is critical to promote long term investments to enhance climate resilience of vulnerable farmers located in dry corridor, through the implementation of adaptive agroecosystem management to families that are facing high levels of poverty, limited technical assistance and lack of resources such as productive soil and water.

It is important to underline that, in a 20 years horizon, all adaptation packages are financially viable with IRR that ranges from 15% to 22%. This means that families will have new income generating opportunities, equivalent to US$14/ha and US$177/ha per year as a result of the adoption of the agronomical practices that also promotes restoration of the landscape and provision of ecosystem services. Also, both operational centers to add value to coffee and cocoa are financially viable.

Nevertheless, even though farmers will generate new revenues, the level of income is still very low in long term horizon. For a 10 years horizon, only Category II is financially viable due to the fact that the effects of proposed adaptive agroecosystem management gradually will be taking place over time, and in a long term analysis it will be reflected the full revenue stream of benefits. The negative returns over a 10 years horizon underline the need for grant financing to encourage climate-resilient investments. This shows that it needs time to bring farmers to a level in which they are financially sustainable and have returns greater than the cost of capital. This is a condition to enhance the sustainability of results and the exit strategy of the project.

Without this intervention that allows long term investments, family farmers will continue to live under vulnerable conditions to climate change and the flow of public goods to society (carbon capture, water flow regulation, erosion control) will be reduced.

[18] This situation does not mean that family farmers will receive negative cash flows during the first years, due to incremental costs of the implementation of adaptation packages will be contributed by the project, not by families. While this is a financial cost, it is not paid by the farmer.

A sensitivity analysis was performed for each adaptation package and for the center to add value to coffee and cocoa, to evaluate how financial indicators changes with a variations of key variables:

- Reductions in expected flows of benefits from agriculture
- Delay in benefit generation due to lags in project implementation
- Increment in investment costs

Table 14. Sensitivity analysis

Variable	Variation	Basic crops		Coffee		Cocoa		Family gardens		Processed Coffee		Processed Cocoa	
		Total net present value US$	Internal Rate of Return	Total net present value US$	Internal Rate of Return	Total net present value US$	Internal Rate of Return	Total net present value US$	Internal Rate of Return	Total net present value US$	Internal Rate of Return	Total net present value US$	Internal Rate of Return
Reduction in benefits	-5%	$378	16.0%	$31	12.1%	$784	15.9%	($97)	8.2%	($233,961)	4.6%	$122,471	17.6%
	-10%	($180)	10.2%	($893)	8.9%	$242	13.2%	($303)	0.2%	($491,392)	-11.5%	$61,358	14.8%
	-15%	($738)	4.7%	($1,817)	5.5%	($300)	10.5%	($508)	-10.5%	($748,823)	.	$244	12.0%
Delay in benefit generation	1 year	($423)	9.5%	($1,344)	8.6%	($25)	11.9%	($387)	4.4%	($616,229)	1.4%	$37,481	13.3%
	2 years	($1,635)	4.5%	($3,370)	4.8%	($1,226)	8.1%	($830)	-0.3%	($1,187,390)	-4.0%	($92,969)	9.4%
	3 years	($2,718)	1.3%	($5,206)	1.9%	($2,305)	5.2%	($1,226)	-3.3%	($1,697,355)	-7.7%	($209,442)	6.7%
Increment in investment costs	10%	$757	19.3%	$794	14.6%	$1,213	17.8%	$52	13.8%	($50,200)	10.8%	$135,188	17.5%
	20%	$578	17.0%	$633	14.0%	$1,098	17.0%	($4)	11.9%	($123,871)	9.2%	$86,791	15.2%
	30%	$400	15.1%	$473	13.4%	$984	16.3%	($60)	10.3%	($197,542)	7.9%	$38,394	13.3%

4 Economic Analysis

An economic analysis of the project is performed to assess the incremental adaptation benefits to climate change for the society through the comparison of the *without project* scenario versus the improves situation promoted by the project. The analysis considers two type of benefits of adaptation to climate change:

- Marketable benefits that comes from increase in production in climate resilient agricultural systems
- Non market benefits associated to the provision of ecosystem service as a result of landscape restoration activities, considering indicative monetary values for the provision of these services (per hectare/year). These services represented are public goods and they are not captured by markets and rarely considered as part of decision-making processes despite that their economic value can exceed the global GDP (de Groot et al, 2012[19] and Costaza et al, 1997[20]).

4.1 Marketable benefits from Output 1.2. and Output 1.3.

The incremental economic benefit from adaptation to climate change in agriculture comes from a cost-benefit analysis, which considers the increase in production in climate resilient agricultural systems, comparing the with and without project scenarios. It considered the same methodology and assumptions that were specified in the financial analysis, but with the difference that the economic analysis includes economic prices. In the case of Guatemala, project planning and development entities do not officially have a nominal value of conversion rates from private to economic prices. Therefore, the study "Estudio de la estimación de los precios de cuenta de eficiencia para su aplicación en la evaluación económica" (University of San Carlos de Guatemala, 2011)[21], which estimates the conversion factors of private prices at economic prices for the country of Guatemala, including a social discount rate, was used as reference. The economic rate of discount considered is 12%[22], the conversion factor for price of unqualified labor is 0.618, the conversion factor for price of qualified labor is 0.95 and a conversion factor for price of inputs and outputs of 0.8684.

Table 15. Economic indicators per adaptation package and for operational center to add value

Adaptation Package	Without project		With project		Net effect		
	NPV (US$/ha)	Equivalent Annual Payment (US$/ha)	NPV (US$/ha)	Equivalent Annual Payment (US$/ha)	NPV (US$/ha)	Internal Rate of Return	Incremental Equivalent Annual Payment (US$/ha)
	10 years horizon						
Basic Crops	$979	$173	$1,455	$257	$476	30.5%	$84
Coffee	$5,074	$898	$4,380	$775	-$694	6.9%	-$123
Cocoa	$1,944	$344	$2,616	$463	$672	20.2%	$119
Family gardens	$647	$115	$901	$159	$253	37.4%	$45
	20 years horizon						
Basic Crops	$1,264	$169	$2,639	$353	$1,375	36.2%	$184
Coffee	$6,485	$868	$7,785	$1,042	$1,300	16.8%	$178
Cocoa	$2,463	$330	$5,046	$676	$2,584	27.5%	$346
Family gardens	$826	$111	$1,371	$184	$545	41%	$73
Operational center to add value to coffee	-	-	-	-	$54,347	13,7%	$7,276
Operational center to add value to cocoa	-	-	-	-	$153,473	20.0%	$20,547

The analysis show that, in a 20 years horizon, all adaptation packages and both operational centers to add value to coffee and cacao are economically viable.

Considering the economic incremental flow for each type of adaptation package during the 20 years of lifespan of the project, the benefit was estimated by the extrapolation to the expected amount of hectares

[19] de Groot, R., Brander, L., Ploeg, S., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein L., Hussain, S., Kumar, P., McVittie., A., Portela, R., Rodriguez, L., Brink, P., van Beukering, P. 2012. Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services 1 (2012) 50–61.

[20] Costanza, R., d'Arge, R., De Groot, R.S., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruel, J., Raskin, R.G., Sutton, P., Van den Belt, M., 1997. The value of the world's ecosystem service and natural capital. Nature 387, 253–260.

[21] Rossi, H. 2011. Estudio de la estimación de los precios de cuenta de eficiencia para su aplicación en la evaluación económica. University of San Carlos de Guatemala.

[22] The economic discount rate considered (12%) follows the recommendation from the Interamerican Development Bank that defines that international institutions, such as the World Bank, the Interamerican Development Bank or the Asian Development Bank uses a constant rate that range of 10-12%. This rate includes different risks (macroeconomic and agricultural risks) and inflation. To add rigorousness it was considered the higher rate. FAO does not have an official rate of economic discount.

that would be under each category, considering the gradual inclusion of participants in seven stages (Table 2). Also, it is considered the economic results of the operational centers to add value to coffee (2) and to cocoa (1).

4.2 Non market benefits from ecological services

The incremental economic benefit for the project comes from the improvement of ecosystem services provided by landscape restoration implemented by the project. In this estimation, 16,400 hectares of landscape restoration promoted by the project will improve ecological services.

Table 16. Hectares incorporated into the project of landscape restoration

Landscape Restoration	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Total
Forest protection – Output 2.2.	20	20	20	20	20	10	10	120
Forest management - Output 2.2.	27	27	27	27	27	14	13	162
Coffee - Output 2.2.	3781	1986	1912	1854	1615	808	807	12,762
Coffee – Output 1.2.	308	300	300	300	300	150	150	1,808
Cocoa – Output 1.2.	937	250	200	161	0	0	0	1,548
Total	5073	2583	2459	2362	1962	982	980	16,400

The methodology that has been applied is the Unit Value Transfer, which consists of taking the average values per unit of data from a reference study to estimate total benefits in the study receiving the transfer information. To obtain the total value of the ecosystem services, the value obtained from the transfer must be multiplied by the total number of environmental units that are generated by the operation of the ecosystem services.

$$EBES = ECV * NA$$

Where:
EBES: Economic benefit for ecological services
EVC: Economic value per unit of ecological service
NA: Number of environmental units that provides the ecological service

These ecosystem services represent public goods that are not captured by markets or by the GDP and do not generate revenues for farmers despite the fact that much of the cost required to ensure their provision are private costs paid by farmers. For each biome ecosystem services were identified and valued according to de Groot et al, 2012[23] adjusted to local parity purchase power and inflation. It is considered that the project will benefit 282 hectares of forest management and forest restoration, plus 16,118 hectares of agroforestry systems based in cocoa and coffee promoted through Output 1.2. and Output 2.2.

There are studies that prove that the hydrological and erosion control services in agroforestry systems are comparable to those that can be achieved in natural forest ecosystems, that can be considered as applicable in the case of Guatemala. Studies such as Coster (1938)[24], Fahmunddin and van Noordwijk (2004)[25], and van Noordwijk et. al (2004)[26], indicate that from a hydrological point of view, the effects of maintaining agroforestry systems such as coffee are very similar to those of the forest. This refers to water recharge and discharge as well as erosion control. This conclusion can also be applied to the cocoa agroforestry system, due to the fact that it also maintains an arboreal coverage. For this reason, it has been

[23] Based in de Groot, R., Brander, L., Ploeg, S., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein L., Hussain, S., Kumar, P., McVittie., A., Portela, R., Rodriguez, L., Brink, P., van Beukering, P. 2012. Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services 1 (2012) 50–61.
[24] Coster, C. (1938). Naschrift: herbebossching op Java (Postscript: reforestation on Java). En M. En van Noordwijk, A. Farida, S. Didik, H. Kurniatun, G. Pasya, & B. (.Verbist, *Role of agroforestry in maintenance of hydrological functions in water catchment areas.* World Agroforestry.
[25] Fahmunddin, A., van Noordwijk, F., & van Noordwijk, M. (2004). Hydrological impacts of forest, agroforestry and upland cropping as a basis for rewarding environamental service providers in Indonesia. *World Agroforestry Center*.
[26] van Noordwijk, M., Farida, A., Didik, S., Kurniatun, H., Pasya, G., & Verbist, B. (2004). Role of agroforestry in maintenance of hydrological functions in water catchment areas. *World Agroforestry*

considered that the hectares of cocoa and coffee agroforestry systems promoted by the project generate the same ecosystem services as forests. It is assumed that these ecosystems currently have a capacity to provide ecosystem services at 40% of their potential (baseline) due to their degradation. Therefore, project will seek to restore the 90% of ecosystem services provision. Thus, 50% of the values presented in Table 17 will be considered as benefit for biome restoration. The same gradual inclusion of beneficiaries in seven stages of hectares is considered.

Table 17. Potential monetary values for each service (US$/ha/year)[27]

Ecosystem Service	Woodlands
Water provision	29
Erosion prevention	7.3
TOTAL (US$/ha/year)	36.3

The incremental benefits of carbon sequestration were modelled over a period of 20 years, although it is expected that the impact would last longer. A shadow price of US$ 60/tCO2 with an annual incremental rate of 2.25% as proposed by de World Bank as the social value of carbon[28]. It is expected to reduce emissions during the lifetime of the project evaluation (20 years) of 988,260 tCO2eq. Then, the economic benefit of carbon sequestration is estimated as follows:

$$EBCS = \sum_{i} PtCO2_i * tCO2_i$$

Where:
EBCS: Economic benefit for carbon sequestration
$PtC0_2$: Price per ton of CO2 sequestered in year i
$tC0_2$: ton of CO2 sequestered in year i

4.3 Total Economic benefits

The marketable (agricultural production) and non-marketable benefits (the three ecosystem services considered) are aggregated to obtain the overall estimation of the economic value of the project, considering the total investment cost of US$66.7 million (US$29.8 million from Green Climate Fund, US$7 from KOIKA, US$5.7 million from MAGA and US$24.1 from INAB).

For a 20 years horizon, the incremental economic benefit for the entire project is estimated in US$28.2 million, with an internal rate of return of 50.0%. With an investment of US$66.7 million, it is expected to create economic benefits in excess to the opportunity cost of capital (12%), and produce a bonus of US$28.2 million. This means an economic net present value per benefited hectare of US$987, and an economic net present value per beneficiary of US$217. For a 10 years horizon, the incremental economic net present value is US$10.9 million, with an internal rate of return of 45.5%.

It is important to highlight the importance of co-benefits in the economic evaluation, since the value of the restoration of the ecosystem services of erosion control, water provision and carbon sequestration represents 58% of total economic benefits.

It should be noted that RELIVE will contribute to strengthening the resilience of other ecosystem services that have not been considered: biodiversity conservation, genetic resources conservation, medicinal resources and recreation. Nor was possible to quantify important social benefits that have a direct impact on the well-being of families, such as the impact of food production on family health and the foregone time

[27]Based in de Groot, R., Brander, L., Ploeg, S., Costanza, R., Bernard, F., Braat, L., Christie, M., Crossman, N., Ghermandi, A., Hein L., Hussain, S., Kumar, P., McVittie., A., Portela, R., Rodriguez, L., Brink, P., van Beukering, P. 2012. Global estimates of the value of ecosystems and their services in monetary units. Ecosystem Services 1 (2012) 50–61.
[28] World Bank, 2017. Guidance note on shadow price of carbon in economic analysis

to fetch water. None of these important benefits was possible to quantify in the economic analysis due to lack of information.

A sensitivity analysis was also performed, to evaluate how the economic indicators of the overall project changes with a variations of key variables:

- Reductions in expected flows of benefits from marketable and not marketable benefits.
- Delay in benefit generation due to lags in project implementation
- Increment in investment costs

The table below shows that the net present value of overall project still presents positive economic indicator even when exist reduction of 15% of expected benefits, there is a delay in benefit generation of 3 years, or overruns appears (up to 15%). This reveals the robustness of RELIVE.

Table 18. Sensitivity analysis

Variable	Variation	Total net present value US$ million	Economic Internal Rate of Return
Reduction in benefits	-5%	$26.4	47.8%
	-10%	$24.6	45.7%
	-15%	$22.9	43.5%
Delay in benefit generation	1 year	$23.4	38.0%
	2 years	$19.1	31.4%
	3 years	$15.4	26.9%
Increment in investment costs	5%	$26.1	40.2%
	10%	$24.0	34.0%
	15%	$21.9	29.5%

The analysis shows that the RELIVE is a robust project and creates economic value for society considering the productive, ecological and climate impacts. The economic analysis considered benefits from agriculture production and only three ecological services: erosion control, water provision and carbon sequestration. It was not possible to account for a number of other economic effects. Including: i) other ecosystem services, such as genetic resources conservation, medicinal resources and recreation; ii) the important impact of food production on family health; and iii) the benefits of foregone time to fetch water. Thus, this analysis underestimate the real economic impact for society, and shall be considered as the inferior limit of the economic benefits.

5 Appendix
5.1 Investment Cost
5.1.1 Basic grains

Table 19. Total cost of investment in basic grains. With Project Scenario.

Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Chop and stubble spreading	24	24	24	24	24	24	24
Silos to storage grains	115	0	0	0	0	0	0
Land preparation for tree planting	73	0	0	0	0	0	0
Drawing of contour line	48	0	0	0	0	0	0
Tree pruning	0	4	4	4	4	16	16
Reservoir elaboration	81	0	0	0	0	0	0
Reservoir maintenance	16	16	16	16	16	16	16
Geomenbrane installation	8	0	0	0	0	0	0
Soil preparation	145	145	145	145	145	145	145
Planting	57	57	57	57	57	57	57
Weed control	137	135	132	130	128	125	123
Pest and diseases control	32	32	32	32	32	32	32
Fertilization	65	64	63	62	61	60	59
Manual harvest	40	40	40	40	40	40	40
Pod removal	16	16	16	16	16	16	16
Harvest transportation	16	16	16	16	16	16	16
Grain cleaning	8	8	8	8	8	8	8
Grain drying	16	16	16	16	16	16	16
Post-harvest management	24	24	24	24	24	24	24
Maize bend	16	16	16	16	16	16	16
Maize shelling	16	16	16	16	16	16	16
Storage	8	8	8	8	8	8	8
Plant selection to obtain seed	65	65	65	65	65	65	65
Tree planting	32	0	0	0	0	0	0
Grain treatment	24	24	24	24	24	24	24
Plumajillo plants	2	0	0	0	0	0	0
Jocote plants	1	0	0	0	0	0	0
Nance plants	1	0	0	0	0	0	0
Roots and tubers	0	0	0	0	0	0	0
Equipment	933	0	0	0	0	0	0
Pipeline	91	0	0	0	0	0	0
Piping elbows and straight	34	0	0	0	0	0	0
Poliduct hose	154	0	0	0	0	0	0
Drip tape	660	0	0	0	0	0	0
Filter	52	0	0	0	0	0	0
Connections for the piping system	156	0	0	0	0	0	0
Fruit harvesting	8	8	8	8	16	16	16
Firewood or wood harvest	16	16	16	16	16	16	16
Been seeds	61	0	0	0	0	0	0
Fertilizer	332	327	322	318	313	309	304
Herbicide	29	29	28	28	27	27	26
Fungicide	49	48	47	45	44	43	42
Inputs to treat seed previous sowing	1	1	1	1	1	1	1
Shovel	24	0	24	0	24	0	24
Hoe	18	0	18	0	18	0	18
Machete	8	0	8	0	8	0	8
Seed sampler	5	0	5	0	5	0	5
Bar/stick	17	0	0	0	17	0	0
Oxen rental	117	117	117	117	117	117	117
Maize seeds	12	0	0	0	12	0	0
Airtight container to storage seeds	29	0	0	0	29	0	0
Inputs to treat seed previous sowing	1	1	1	1	1	1	1
Machete	4	4	4	4	4	4	4
Plant (for timber production)	135	0	0	0	0	0	0
Bar/stick	17	17	17	17	17	17	17
Shovel	12	12	12	12	12	12	12

Transportation	59	59	59	59	59	59	59
Machete	4	4	4	4	4	4	4
Seed sampler	2	2	2	2	2	2	2
Inputs to treat seed previous sowing	2	2	2	2	2	2	2

Table 20. Total cost of investment in in basic grains. Without Project Scenario.

Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Soil preparation	154	154	154	154	154	154	154
Planting	57	57	57	57	57	57	57
Weed control	162	162	162	162	162	162	162
Pest and diseases control	32	32	32	32	32	32	32
Fertilization	65	65	65	65	65	65	65
Maize bend	16	16	16	16	16	16	16
Manual harvest	40	40	40	40	40	40	40
Harvest transportation	16	16	16	16	16	16	16
Maize shelling	16	16	16	16	16	16	16
Grain drying	16	16	16	16	16	16	16
Storage	8	8	8	8	8	8	8
Post-harvest management	24	24	24	24	24	24	24
Pod removal	16	16	16	16	16	16	16
Oxen rental	65	65	65	65	65	65	65
Been seeds	61	0	0	0	0	0	0
Maize seeds	12	0	0	0	0	0	0
Fertilizer	332	332	332	332	332	332	332
Fungicide	49	49	49	49	49	49	49
Herbicide	29	29	29	29	29	29	29
Shovel	24	0	24	0	24	0	24
Hoe	18	0	18	0	18	0	18
Machete	8	0	8	0	8	0	8
Seed sampler	5	0	5	0	5	0	5

5.1.2 Coffee

Table 21. Total cost of investment in coffee. With Project Scenario.

Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Protectant	3	3	3	3	3	3	3
Fungicide	10	10	10	10	10	10	10
Fertilizer	4	6	7	9	9	9	9
Dolomite lime	16	0	0	0	16	0	0
Coffee plants	1,060	1,060	1,060	1,060	0	0	0
Banana plants	24	24	24	24	0	0	0
Machete	4	4	4	4	0	0	0
Shovel	12	12	12	12	0	0	0
Bar/stick	17	17	17	17	0	0	0
Plants (Fruit tree)	10	10	10	10	0	0	0
Firewood	133	133	133	133	0	0	0
Plant (for timber production)	27	27	27	27	0	0	0
Transportation	88	88	88	88	0	0	0
Plot design	8	8	8	8	0	0	0
Old coffee trees cutting	32	32	32	32	0	0	0
Plot layout	8	8	8	8	0	0	0
Hole digging	16	16	16	16	0	0	0
New coffee planting	16	16	16	16	0	0	0
Hold digging for shade trees	4	4	4	4	0	0	0
Fruit trees planting	2	2	2	2	0	0	0
Timber trees planting	2	2	2	2	0	0	0
Services trees planting	2	2	2	2	0	0	0
Machete weeding	65	65	65	65	65	65	65
Shade trees pruning	16	16	16	16	16	16	16
Banana thinning and defoliation	16	16	16	16	16	16	16
Banana harvest	16	16	16	16	16	16	16
Fruit harvesting	8	8	8	8	16	16	16
Firewood or wood harvest	16	16	16	16	24	24	24
Coffee harvesting	283	283	283	283	323	323	323
Maintenance pruning of old coffee tree plants	32	24	16	8	0	0	0
coffee hybrid tree shaping pruning	8	16	24	32	32	16	8
Fertilization	40	57	65	81	81	81	81
Lime application	16	0	0	0	16	0	0
Application of chemical products	32	32	32	32	32	32	32
Coffee hybrids tree formation pruning	0	0	0	0	8	24	32

Table 22. Total cost of investment in coffee. Without Project Scenario.

Name	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Fertilizer	4	4	4	4	4	4	4
Fungicide	10	10	10	10	10	10	10
Herbicide	7	7	7	7	7	7	7
Machete	4	4	4	4	4	4	4
Handsaw	13	13	13	13	13	13	13
Machete weeding	97	97	97	97	97	97	97
Herbicide application	12	12	12	12	12	12	12
Soil chemical fertilization	40	40	40	40	40	40	40
Tree pruning	32	32	32	32	32	32	32
Banana thinning and defoliation	32	32	32	32	32	32	32
Coffee pruning	40	40	40	40	40	40	40
Pest management	12	12	12	12	12	12	12
Fungicide application	8	8	8	8	8	8	8
Banana harvest	16	16	16	16	16	16	16
Fruit harvesting	16	16	16	16	16	16	16
Firewood or Wood harvest.	16	16	16	16	16	16	16
Labor	283	283	283	283	283	283	283

5.1.3 Cocoa

Table 23. Total cost of investment in cocoa. With Project Scenario.

Name	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Bar/stick	17	17	17	17	0	0	0
Banana plants	24	24	24	24	0	0	0
Shovel	12	12	12	12	0	0	0
Cocoa plants	463	463	463	463	0	0	0
Transportation	88	88	88	88	0	0	0
Machete	4	4	4	4	0	0	0
Plants (Fruit tree)	10	10	10	10	0	0	0
Plant (for timber production)	27	27	27	27	0	0	0
Firewood	133	133	133	133	0	0	0
Dolomite lime	16	0	0	0	0	0	0
Fertilizer	1	3	4	6	6	6	6
Protectant	3	3	3	3	3	3	3
Hole digging	16	16	16	16	0	0	0
Old cocoa and old trees cutting.	40	40	40	40	0	0	0
Plot design	8	8	8	8	0	0	0
New cocoa trees planting	16	16	16	16	0	0	0
Plot layout	8	8	8	8	0	0	0
Hold digging for shade trees	4	4	4	4	0	0	0
Banana harvest	16	16	16	16	16	16	16
Cocoa harvesting	65	65	65	65	113	113	113
Fruit harvesting	8	8	8	8	16	16	16
Firewood or Wood harvest.	16	16	16	16	24	24	24
Banana thinning and defoliation	16	16	16	16	16	16	16
Machete weeding	65	65	65	65	65	65	65
Shade trees pruning	0	0	0	0	16	16	16
Services trees planting	2	2	2	2	0	0	0
Fruit trees planting	2	2	2	2	0	0	0
Timber trees planting	2	2	2	2	0	0	0
Shape pruning	24	0	0	0	0	0	0
Shape pruning (clone cocoa)	0	48	73	97	73	48	24
Clone cocoa maintenance pruning	0	0	0	0	24	48	73
Maintenance pruning (old cocoa)	81	40	24	16	0	0	0
Lime application	16	0	0	0	16	0	0
Fertilization	16	32	48	65	65	65	65
Phytosanitary pruning	97	97	97	97	97	97	97

Table 24. Total cost of investment in cocoa. Without Project Scenario.

Name	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Handsaw	13	13	13	13	13	13	13
Machete	4	4	4	4	4	4	4
Banana harvest	16	16	16	16	16	16	16
Cocoa harvesting	48	48	48	48	48	48	48
Fruit harvesting	8	8	8	8	8	8	8
Firewood or Wood harvest.	16	16	16	16	16	16	16
Banana thinning and defoliation	16	16	16	16	16	16	16
Machete weeding	65	65	65	65	65	65	65
Tree pruning	65	65	65	65	65	65	65
Old coffee trees maintenance pruning	48	48	48	48	48	48	48
Cocoa replanting	8	8	8	8	8	8	8

5.2 Yields

Table 25. Yields for basic grains

SYSTEM	Scenario	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
BASIC GRAINS	WHITH PROJECT	Beans	Ton	0.84	0.85	0.87	0.90	0.92	0.95	0.97	1.00	1.02	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
BASIC GRAINS	WHITH PROJECT	Maize	Ton	1.70	1.74	1.80	1.86	1.94	1.98	2.04	2.10	2.16	2.24	2.22	2.22	2.22	2.22	2.24	2.22	2.22	2.22	2.22	2.24
BASIC GRAINS	WHITH PROJECT	Nance	Kg	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
BASIC GRAINS	WHITH PROJECT	Jocote	thousand	0	0	0	0	0	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
BASIC GRAINS	WHITH PROJECT	Firewood	m3 st	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BASIC GRAINS	WHITH PROJECT	Timber	Tree	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2
BASIC GRAINS	WHITH PROJECT	Sweet potato	Ton	0.71	0.71	0.71	0.71	0.71	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475
BASIC GRAINS	WHITHOUT PROJECT	Beans	Ton	0.82	0.82	0.81	0.81	0.81	0.80	0.80	0.80	0.79	0.79	0.79	0.78	0.78	0.78	0.77	0.77	0.76	0.76	0.76	0.75
BASIC GRAINS	WHITHOUT PROJECT	Maize	Ton	1.60	1.59	1.58	1.57	1.57	1.56	1.55	1.54	1.53	1.52	1.52	1.51	1.50	1.49	1.48	1.47	1.47	1.46	1.45	1.44

Table 26. Yields for cocoa

SYSTEM	Scenario	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
COCOA	WHITH PROJECT	Cocoa	kg	200	187.5	187.5	262.5	337.5	450	600	600	570	600	570	600	570	600	570	600	570	600	570	600
COCOA	WHITH PROJECT	Banana	Heads	50	200	300	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
COCOA	WHITH PROJECT	Orange	Unit	2000	2000	2000	2000	3000	4000	4000	4000	3800	4000	3800	4000	3800	4000	3800	4000	3800	4000	3800	4000
COCOA	WHITH PROJECT	Mango	Unit	500	500	500	500	1000	2000	2000	2000	1900	2000	1900	2000	1900	2000	1900	2000	1900	2000	1900	2000
COCOA	WHITH PROJECT	Timber	Tree	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3
COCOA	WHITH PROJECT	Firewood	m3 st	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
COCOA	WHITHOUT PROJECT	Cocoa without	kg	250	241	231	222	213	211	209	207	206	204	202	200	199	197	195	193	192	190	188	186
COCOA	WHITHOUT PROJECT	Banana	Heads	20	19	18	17	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
COCOA	WHITHOUT PROJECT	Orange	Unit	2000	1900	1805	1715	1629	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548	1548
COCOA	WHITHOUT PROJECT	Mango	Unit	500	475	451	429	407	387	387	387	387	387	387	387	387	387	387	387	387	387	387	387

COCOA	WHITHOUT PROJECT	Timber	Tree	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
COCOA	WHITHOUT PROJECT	Firewood	m3 st	2.00	1.90	1.81	1.71	1.63	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55

Table 27. Yields for coffee.

SYSTEM	Scenario	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
COFFEE	WHITH PROJECT	Coffee	kg	1948	1948	2532	3506	3896	4870	5844	5844	5260	5844	5260	5844	5260	5844	5260	5844	5260	5844	5260	5844
COFFEE	WHITH PROJECT	Banana	Heads	50	200	300	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
COFFEE	WHITH PROJECT	Orange	Unit	2000	2000	2000	2000	3000	4000	4000	4000	3600	4000	3600	4000	3600	4000	3600	4000	3600	4000	3600	4000
COFFEE	WHITH PROJECT	Mango	Unit	500	500	500	500	1000	2000	2000	2000	1800	2000	1800	2000	1800	2000	1800	2000	1800	2000	1800	2000
COFFEE	WHITH PROJECT	Timber	Tree	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3
COFFEE	WHITH PROJECT	Firewood	m3 st	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
COFFEE	WHITHOUT PROJECT	Coffee	kg	3571	3437	3303	3169	3035	3017	3000	2982	2964	2946	2928	2910	2893	2875	2857	2839	2821	2803	2785	2768
COFFEE	WHITHOUT PROJECT	Banana	Heads	100	95	90	85	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
COFFEE	WHITHOUT PROJECT	Orange	Unit	3000	2850	2700	2550	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
COFFEE	WHITHOUT PROJECT	Mango	Unit	500	475	450	425	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
COFFEE	WHITHOUT PROJECT	Timber	Tree	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
COFFEE	WHITHOUT PROJECT	Firewood	m3 st	2	1.9	1.8	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6

Table 28. Yields for family gardens.

SYSTEM	Scenario	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
GARDENS	WHITH PROJECT	Chayote (4 plants)	Unit	80	120	120	80	120	120	120	80	120	120	120	80	120	120	120	80	120	120	120	80
GARDENS	WHITH PROJECT	Passion Fruit (4 plants)	Unit	120	160	160	120	160	160	160	120	160	160	160	120	160	160	160	120	160	160	160	120
GARDENS	WHITH PROJECT	Egg production	Unit	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022
GARDENS	WHITH PROJECT	Sale of discard birds	Unit	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
GARDENS	WHITH PROJECT	Mango (3 plants)	Unit	0	0	0	0	80	120	200	320	400	480	480	480	480	480	480	480	480	480	480	480
GARDENS	WHITH PROJECT	Orange (5 plants)	Unit	0	0	0	0	100	200	280	400	500	500	500	500	500	500	500	500	500	500	500	500
GARDENS	WHITH PROJECT	Avocado (2 plants)	Unit	0	0	0	0	80	160	240	240	240	240	240	240	240	240	240	240	240	240	240	240
GARDENS	WHITH PROJECT	Cabbage	kg	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
GARDENS	WHITH PROJECT	Lettuce	Pound	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
GARDENS	WHITH PROJECT	Carrot	Pound	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
GARDENS	WHITH PROJECT	Onion	Pound	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
GARDENS	WHITH PROJECT	Sweet pepper	Pound	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
GARDENS	WHITH PROJECT	tomato	Pound	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	320
GARDENS	WHITHOUT PROJECT	Cabbage	Pound	60	60	59	59	59	58	58	58	58	57	57	57	56	56	56	55	55	55	55	54
GARDENS	WHITHOUT PROJECT	Lettuce	Pound	80	80	79	79	78	78	77	77	77	76	76	75	75	75	74	74	73	73	73	72
GARDENS	WHITHOUT PROJECT	Carrot	Pound	100	99	99	98	98	97	97	96	96	95	95	94	94	93	93	92	92	91	91	90
GARDENS	WHITHOUT PROJECT	Onion	Pound	120	119	119	118	117	117	116	116	115	114	114	113	113	112	111	111	110	110	109	108
GARDENS	WHITHOUT PROJECT	Sweet pepper	Pound	240	239	237	236	235	234	232	231	230	229	228	226	225	224	223	222	220	219	218	217
GARDENS	WHITHOUT PROJECT	tomato	Pound	320	318	317	315	313	312	310	308	307	305	303	302	300	299	297	295	294	292	291	289

5.3 Financial Cash flows

Table 29. Financial Cash Flow basic grains

INGRESO O COST	WITH AND WHITHOUT PROJECT	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
COST	WHITH PROJECT	I	Oxen rental	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
COST	WHITH PROJECT	I	Hoe	16	0	16	0	16	0	16	0	16	0	16	0	16	0	16	0	16	0	16	0
COST	WHITH PROJECT	I	Bar/stick	15	0	0	0	15	0	0	0	0	15	0	0	0	0	15	0	0	0	0	15
COST	WHITH PROJECT	I	Silos to storage grains	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Seed sampler	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	WHITH PROJECT	I	Fertilizer	292	288	284	280	276	272	268	264	260	256	253	249	246	242	239	239	239	239	239	239
COST	WHITH PROJECT	I	Herbicide	26	25	25	24	24	24	23	23	22	22	22	21	21	20	20	20	20	20	20	20
COST	WHITH PROJECT	I	Fungicide	43	42	41	40	39	38	37	36	35	35	35	35	35	35	35	35	35	35	35	35
COST	WHITH PROJECT	I	Inputs to treat seed previous sowing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
COST	WHITH PROJECT	I	Machete	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0	7	0
COST	WHITH PROJECT	I	Shovel	21	0	21	0	21	0	21	0	21	0	21	0	21	0	21	0	21	0	21	0
COST	WHITH PROJECT	I	Jocote plants	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Plant (for timber production)	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Nance plants	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Plumajillo plants	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Tubers and roots	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Airtight container to storage seeds	26	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	26
COST	WHITH PROJECT	I	Been seeds	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	I	Maize seeds	39	0	0	0	39	0	0	0	39	0	0	0	39	0	0	0	39	0	0	0
COST	WHITH PROJECT	I	Transportation	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	J	Harvest transportation	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Storage	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	WHITH PROJECT	J	Pod removal	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Weed control	103	101	99	98	96	94	92	91	89	88	86	84	83	81	80	80	80	80	80	80
COST	WHITH PROJECT	J	Pest and diseases control	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
COST	WHITH PROJECT	J	Manual harvest	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
COST	WHITH PROJECT	J	Maize shelling	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Maize bend	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Fertilization	48	48	47	46	46	45	44	44	43	43	42	41	41	40	40	40	40	40	40	40
COST	WHITH PROJECT	J	Grain cleaning	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	WHITH PROJECT	J	Post-harvest management	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WHITH PROJECT	J	Chop and stubble spreading	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WHITH PROJECT	J	Tree planting	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	J	Tree pruning	0	3	3	3	3	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Ground preparation	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109
COST	WHITH PROJECT	J	Ground preparation for tree planting	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	J	Grain drying	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	J	Plant selection to obtain seeds	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WHITH PROJECT	J	Planting	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
COST	WHITH PROJECT	J	Grain treatment	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WHITH PROJECT	J	Drawing of contour line and infiltration ditches	36	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT PROJECT	I	Hoe	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0	8	0
COST	WITHOUT PROJECT	I	Seed sampler	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0
COST	WITHOUT PROJECT	I	Fertilizer	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
COST	WITHOUT PROJECT	I	Herbicide	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
COST	WITHOUT PROJECT	I	Fungicide	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
COST	WITHOUT PROJECT	I	Machete	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	WITHOUT PROJECT	I	Shovel	11	0	11	0	11	0	11	0	11	0	11	0	11	0	11	0	11	0	11	0
COST	WITHOUT PROJECT	i	Been seeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WITHOUT PROJECT	I	Maize seeds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

COST	WITHOUT PROJECT	J	Harvest transportation	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT PROJECT	J	Storage	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	WITHOUT PROJECT	J	Oxen rental	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WITHOUT PROJECT	J	Pod removal	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT PROJECT	J	Weed control	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
COST	WITHOUT PROJECT	J	Pest and diseases control	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WITHOUT PROJECT	J	Manual harvest	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
COST	WITHOUT PROJECT	J	Maize shelling	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT PROJECT	J	Maize bend	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT PROJECT	J	Fertilization	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
COST	WITHOUT PROJECT	J	Post-harvest management	18	18	18	18	18	17	17	17	17	17	17	17	16	16	16	16	16	16	16	15
COST	WITHOUT PROJECT	J	Soil preparation	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
COST	WITHOUT PROJECT	J	Grain drying	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
COST	WITHOUT PROJECT	J	Planting	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
INCOME	WHITH PROJECT	Beans	ton	739	744	766	789	811	834	856	879	901	924	924	924	924	924	924	924	924	924	924	924
INCOME	WHITH PROJECT	Maize	ton	340	348	360	372	388	396	408	420	432	448	444	444	444	444	448	444	444	444	444	448
INCOME	WHITH PROJECT	Nance	Unit	0	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
INCOME	WHITH PROJECT	Jocote	Unit	0	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
INCOME	WHITH PROJECT	Firewood	m3 st	0	0	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
INCOME	WHITH PROJECT	Timber	Tree	0	0	0	0	0	0	0	0	0	74	74	74	74	74	148	148	148	148	148	148
INCOME	WHITH PROJECT	Sweet potato	ton	200	200	200	200	200	134	134	134	134	134	134	134	134	134	134	134	134	134	134	134
INCOME	WITHOUT PROJECT	Beans	ton	722	719	716	712	709	706	703	700	697	694	691	688	685	682	679	676	673	670	667	664
INCOME	WITHOUT PROJECT	Maize	ton	320	318	317	315	313	312	310	308	307	305	303	301	300	298	296	295	293	291	290	288

Table 30. Financial Cash Flow coffee

INCOME OR COST	WHITH AND WITHOUT PROJECT	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
INCOME	WHITH PROJECT	Café	kg	857	857	1114	1543	1714	2143	2571	2571	2314	2571	2314	2571	2314	2571	2314	2571	2314	2571	2314	2571
INCOME	WHITH PROJECT	Banana	Heads	99	396	594	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
INCOME	WHITH PROJECT	Orange	Unit	66	66	66	66	99	132	132	132	119	132	119	132	119	132	119	132	119	132	119	132
INCOME	WHITH PROJECT	Mango	Unit	50	50	50	50	99	198	198	198	178	198	178	198	178	198	178	198	178	198	178	198
INCOME	WHITH PROJECT	Timber	Tree	74	74	74	74	74	74	74	74	74	74	74	74	74	74	222	222	222	222	222	222
INCOME	WHITH PROJECT	Firewood	m3 st	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
INCOME	WITHOUT PROJECT	Coffee	kg	1571	1512	1453	1394	1336	1328	1320	1312	1304	1296	1288	1281	1273	1265	1257	1249	1241	1233	1226	1218
INCOME	WITHOUT PROJECT	Banana	Heads	198	188	178	168	158	158	158	158	158	158	158	158	158	158	158	158	158	158	158	158
INCOME	WITHOUT PROJECT	Orange	Unit	99	94	89	84	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79
INCOME	WITHOUT PROJECT	Mango	Unit	50	47	45	42	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
INCOME	WITHOUT PROJECT	Timber	Tree	37	35	33	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
INCOME	WITHOUT PROJECT	Firewood	m3 st	27	25	24	23	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
COST	WHITH PROJECT	Protectant	kg	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
COST	WHITH PROJECT	Fungicide	Littre	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
COST	WHITH PROJECT	Fertilizer	kg	131	175	197	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263
COST	WHITH PROJECT	Dolomite lime	100 lb.	14	0	0	0	14	0	0	0	14	0	0	0	14	0	0	0	14	0	0	0
COST	WHITH PROJECT	Coffee plants	Unit	700	700	700	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Banana plants	Unit	21	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Machete	Unit	7	0	7	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	WHITH PROJECT	Shovel	Unit	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Bar/stick	Unit	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plants (Fruit tree)	Unit	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Service plants	Unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plant (for timber production)	Unit	24	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Transportation	Wage	77	77	77	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plot design	Wage	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Coffee and old trees cutting	Wage	24	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plot layout	Wage	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Hole digging	Wage	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	New coffee planting	Wage	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

COST	WHITH PROJECT	Hold digging for shade trees	Wage	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Fruit trees planting	Wage	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Timber trees planting	Wage	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Firewood	Wage	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Machete weeding	Wage	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WHITH PROJECT	Shade trees pruning	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Banana thinning and defoliation	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Banana harvest	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Fruit harvesting	Wage	6	6	6	6	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Firewood or Wood harvest.	Wage	12	12	12	12	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WHITH PROJECT	Coffee harvesting	Wage	212	212	273	382	424	527	636	636	636	636	636	636	636	636	636	636	636	636	636	636
COST	WHITH PROJECT	Maintenance pruning of old coffee tree plants	Wage	24	18	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Coffee hybrid tree shape pruning	Wage	6	12	18	24	24	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Fertilization	Wage	30	42	48	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
COST	WHITH PROJECT	Lime application	Wage	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0
COST	WHITH PROJECT	Application of chemical products	Wage	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
COST	WHITH PROJECT	Coffee hybrids tree formation pruning	Wage	0	0	0	0	6	18	24	30	30	30	30	30	30	30	30	30	30	30	30	30
COST	Without	Coffee harvesting	Wage	388	384	379	375	371	367	363	359	354	350	346	342	338	333	329	325	321	317	313	308
COST	Without	Fertilizer	100 lb.	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146
COST	Without	Fungicide	Littre	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
COST	Without	Herbicide	Littre	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	Without	Machete	Unit	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	Without	Handsaw	Unit	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0
COST	Without	Machete weeding	Wage	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
COST	Without	Herbicide application	Wage	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
COST	Without	Soil chemical fertilization	Wage	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
COST	Without	Tree pruning	Wage	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
COST	Without	Banana thinning and defoliation	Wage	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
COST	Without	Coffee pruning	Wage	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
COST	Without	Pest management	Wage	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
COST	Without	Fungicide application	Wage	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	Without	Banana harvest	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	Without	Fruit harvesting	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	Without	Firewood or Wood harvest.	Wage	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Table 31. Financial Cash Flow cocoa.

INCOME or COST	WHITH AND WITHOUT PROJECT	Name	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
INCOME	WHITH PROJECT	Cocoa WHITH PROJECT	kg	392	368	368	515	662	882	1176	1176	1117	1176	1117	1176	1117	1176	1117	1176	1117	1176	1117	1176
INCOME	WHITH PROJECT	Banana	Heads	99	396	594	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
INCOME	WHITH PROJECT	Orange	Unit	66	66	66	66	99	132	132	132	125	132	125	132	125	132	125	132	125	132	125	132
INCOME	WHITH PROJECT	Mango	Unit	50	50	50	50	99	198	198	198	188	198	188	198	188	198	188	198	188	198	188	198
INCOME	WHITH PROJECT	Timber	Tree	74	74	74	74	74	74	74	74	74	74	74	74	74	74	222	222	222	222	222	222
INCOME	WHITH PROJECT	Firewood	m3 st	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
INCOME	WHITH PROJECT	Externalities	$	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INCOME	WITHOUT PROJECT	Cocoa	kg	398	383	368	353	338	335	332	330	327	324	321	318	316	313	310	307	304	302	299	296
INCOME	WITHOUT PROJECT	Banana	Heads	40	38	36	34	32	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
INCOME	WITHOUT PROJECT	Orange	Unit	66	63	60	57	54	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
INCOME	WITHOUT PROJECT	Mango	Unit	50	47	45	42	40	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
INCOME	WITHOUT PROJECT	Timber	Tree	74	70	67	64	60	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
INCOME	WITHOUT PROJECT	Firewood	m3 st	27	25	24	23	22	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
COST	WHITH PROJECT	Bar/stick	Unit	30	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Banana plants	Unit	21	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Shovel	Unit	21	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Cocoa plants	Unit	407	407	407	407	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Transportation	Travel	77	77	77	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Machete	Unit	7	0	7	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	WHITH PROJECT	Plants (Fruit tree)	Unit	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plant (for timber production)	Unit	24	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Service plants	Unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Dolomite lime	100 lb.	14	0	0	0	14	0	0	0	14	0	0	0	14	0	0	0	14	0	0	0
COST	WHITH PROJECT	Fertilizer	kg	58	117	175	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234	234
COST	WHITH PROJECT	Protectant	kg	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
COST	WHITH PROJECT	Hole digging	Labor	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Old cocoa and old trees cutting.	Labor	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plot design	Labor	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	New cocoa trees planting	Labor	12	12	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Plot layout	Labor	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

COST	WHITH PROJECT	Hold digging for shade trees	Labor	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Banana harvest	Labor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Cocoa harvesting	Labor	48	48	48	48	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
COST	WHITH PROJECT	Fruit harvesting	Labor	6	6	6	6	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Firewood or Wood harvest.	Labor	12	12	12	12	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
COST	WHITH PROJECT	Banana thinning and defoliation	Labor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Machete weeding	Labor	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WHITH PROJECT	Shade trees pruning	Labor	0	0	0	0	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WHITH PROJECT	Firewood	Labor	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Fruit trees planting	Labor	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Timber trees planting	Labor	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Shape pruning	Labor	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Shape pruning (clone cocoa)	Labor	0	36	55	73	55	36	18	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Clone cocoa maintenance pruning	Labor	0	0	0	0	18	36	55	73	73	73	73	73	73	73	73	73	73	73	73	73
COST	WHITH PROJECT	Old coffee trees maintenance pruning	Labor	61	30	18	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COST	WHITH PROJECT	Lime application	Labor	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0	12	0	0	0
COST	WHITH PROJECT	Fertilization	Labor	12	24	36	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WHITH PROJECT	Phytosanitary pruning	Labor	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
COST	WITHOUT	Handsaw	Unit	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT	Machete	Unit	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0
COST	WITHOUT	Banana harvest	Labor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT	Cocoa harvesting	Labor	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
COST	WITHOUT	Fruit harvesting	Labor	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
COST	WITHOUT	Firewood or Wood harvest.	Labor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT	Banana thinning and defoliation	Labor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
COST	WITHOUT	Machete weeding	Labor	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WITHOUT	Tree pruning	Labor	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
COST	WITHOUT	Old coffee trees maintenance pruning	Labor	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
COST	WITHOUT	Cocoa replanting	Labor	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Table 32. Financial Cash Flow family gardens

INCOME or COST	WHITH AND WITHOUT PROJECT	Name	Unit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
INCOME	WHITH PROJECT	Chayote (4 plants)	Unit	17.0	25.5	25.5	17.0	25.5	25.5	25.5	17.0	25.5	25.5	25.5	17.0	25.5	25.5	25.5	17.0	25.5	25.5	25.5	17.0
INCOME	WHITH PROJECT	Passion Fruit (4 plants)	Unit	5.1	6.8	6.8	5.1	6.8	6.8	6.8	5.1	6.8	6.8	6.8	5.1	6.8	6.8	6.8	5.1	6.8	6.8	6.8	5.1
INCOME	WHITH PROJECT	Egg production	Unit	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0	92.0
INCOME	WHITH PROJECT	Sale of discard birds	Unit	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
INCOME	WHITH PROJECT	Mango (3 plants)	Unit	0.0	0.0	0.0	0.0	7.9	11.9	19.8	31.7	39.6	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
INCOME	WHITH PROJECT	Orange (5 plants)	Unit	0.0	0.0	0.0	0.0	3.3	6.6	9.2	13.2	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
INCOME	WHITH PROJECT	Avocado (2 plants)	Unit	0.0	0.0	0.0	0.0	13.6	27.2	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8
INCOME	WHITH PROJECT	Cabbage	Kg.	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
INCOME	WHITH PROJECT	Lettuce	Pound	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
INCOME	WHITH PROJECT	Carrot	Pound	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2
INCOME	WHITH PROJECT	Onion	Pound	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7
INCOME	WHITH PROJECT	Sweet pepper	Pound	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5
INCOME	WHITH PROJECT	tomato	Pound	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1	163.1
INCOME	WITHOUT	Cabbage	Kg.	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.2	3.2
INCOME	WITHOUT	Lettuce	Pound	15.3	15.2	15.1	15.0	15.0	14.9	14.8	14.7	14.7	14.6	14.5	14.4	14.3	14.3	14.2	14.1	14.0	14.0	13.9	13.8
INCOME	WITHOUT	Carrot	Pound	21.2	21.1	21.0	20.9	20.8	20.7	20.6	20.5	20.3	20.2	20.1	20.0	19.9	19.8	19.7	19.6	19.5	19.4	19.3	19.2
INCOME	WITHOUT	Onion	Pound	35.7	35.5	35.3	35.1	34.9	34.7	34.5	34.4	34.2	34.0	33.8	33.6	33.5	33.3	33.1	32.9	32.8	32.6	32.4	32.2
INCOME	WITHOUT	Sweet pepper	Pound	132.5	131.8	131.1	130.4	129.7	129.0	128.3	127.6	127.0	126.3	125.6	125.0	124.3	123.6	123.0	122.3	121.7	121.0	120.4	119.8
INCOME	WITHOUT	tomato	Pound	163.1	162.2	161.3	160.5	159.6	158.8	157.9	157.1	156.3	155.4	154.6	153.8	153.0	152.2	151.4	150.6	149.8	149.0	148.2	147.4
COST	WHITH PROJECT	Fruit nursery preparation	Plant	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
COST	WHITH PROJECT	Seedlings	Plant	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9
COST	WHITH PROJECT	Chayote plant material	Unit	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3
COST	WHITH PROJECT	Passion Fruit plants	Unit	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5
COST	WHITH PROJECT	Orange Plants	Unit	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Mango plants	Unit	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Avocado plants	Unit	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Organic fertilizer	100 lb.	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4
COST	WHITH PROJECT	Wooden posts	Unit	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Sticks 4 m long	Unit	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Steel galvanized wire nº 12	lb.	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Cabbage	Ounces	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

COST	WHITH PROJECT	Lettuce	Ounces	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
COST	WHITH PROJECT	Carrot	Ounces	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
COST	WHITH PROJECT	Onion	Ounces	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
COST	WHITH PROJECT	Sweet pepper	Plants	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
COST	WHITH PROJECT	tomato	Plants	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
COST	WHITH PROJECT	Machete	Unit	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0
COST	WHITH PROJECT	Rake		3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0	3.9	0.0
COST	WHITH PROJECT	Shovel	Unit	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0	4.3	0.0
COST	WHITH PROJECT	Bar/stick	Unit	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Ground corn.	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Beans toasting and grounding (canavalia bean)	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Leaves dehydrated and grounded(guácimmo o gandul)	kg	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Egg shell toasted and grounded	Kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Sugar	Kg	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Cooking salt	Kg	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Subtotal inputs	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Laying hens	Unit	53.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Medicines	Bottle	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Forage Peanut	Kg.	10.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Mill (manual)	Unit	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Mesh for henhouse	Linear meters	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	drinkers, feeders, conveyor to feed the birds	Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Posts for a henhouse	Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Ground corn.	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Beans toasting and grounding (canavalia bean)	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Leaves dehydrated and grounded(guácimmo o gandul)	kg	0.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
COST	WHITH PROJECT	Egg shell toasted and grounded	Kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Sugar	Kg	0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
COST	WHITH PROJECT	Cooking salt	Kg	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COST	WHITH PROJECT	Medicines	Bottle	0.0	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
COST	WHITH PROJECT	Yearly bird replacement	Unit	0.0	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7

COST	WHITH PROJECT	Organic fertilizer	100 lb.	0.0	2.6	2.6	1.3	0.0	2.6	2.6	1.3	0.0	2.6	2.6	1.3	0.0	2.6	2.6	1.3	0.0	2.6	2.6	1.3
COST	WHITH PROJECT	Pruning shears	Unit	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1	0.0	1.1
COST	WHITH PROJECT	Machete	Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Handsaw	Unit	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6	0.0	2.6
COST	WHITH PROJECT	Organic fertilizer	100 lb.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Sacks	Unit	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
COST	WHITH PROJECT	Seedlings sowing	Labor	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5
COST	WHITH PROJECT	Soil preparation	Labor	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
COST	WHITH PROJECT	Soil fertilization	Labor	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WHITH PROJECT	Transplant	Labor	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WHITH PROJECT	Weed control	Labor	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WHITH PROJECT	Pest and diseases control	Labor	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
COST	WHITH PROJECT	Harvest	Labor	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
COST	WHITH PROJECT	Packing	Labor	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WHITH PROJECT	Plot layout	Labor	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Posts cutting and transportation	Labor	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Hole digging	Labor	1.7	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Post installing	Labor	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Wire installation	Labor	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Ramada crop planting	Labor	0.5	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
COST	WHITH PROJECT	Fruit plants sowing	Labor	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Irrigation (one year)	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Maize toasting and ground	Labor	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
COST	WHITH PROJECT	Beans toasting and ground	Labor	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
COST	WHITH PROJECT	Tree leaves collection and drying	Labor	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
COST	WHITH PROJECT	Dried leaves grounding	Labor	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
COST	WHITH PROJECT	Egg shells toasting and ground	Labor	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COST	WHITH PROJECT	Birds feeding	Labor	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COST	WHITH PROJECT	Poultry health management	Labor	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
COST	WHITH PROJECT	Henhouse construction	Labor	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
COST	WHITH PROJECT	Poultry proper waste disposal	Labor	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
COST	WHITH PROJECT	Maize toasting and ground	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COST	WHITH PROJECT	Beans toasting and grounding	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Tree leaves collection and drying	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Dried leaves grounding	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Egg shells toasting and ground	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Birds feeding	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Henhouse maintenance	Labor	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
COST	WHITH PROJECT	Poultry proper waste disposal	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Area cleaning	Labor	0.0	0.0	0.6	0.6	4.8	0.6	0.6	0.6	4.8	0.6	0.6	0.6	4.8	0.6	0.6	0.6	4.8	0.6	0.6	0.6	0.6
COST	WHITH PROJECT	Crop pruning	Labor	0.0	0.0	2.4	2.4	0.0	2.4	2.4	2.4	0.0	2.4	2.4	2.4	0.0	2.4	2.4	2.4	0.0	2.4	2.4	2.4	2.4
COST	WHITH PROJECT	Tree pruning	Labor	0.0	0.0	0.0	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
COST	WHITH PROJECT	Organic fertilization	Labor	0.0	0.0	6.1	6.1	2.4	6.1	6.1	6.1	2.4	6.1	6.1	6.1	2.4	6.1	6.1	6.1	2.4	6.1	6.1	6.1	6.1
COST	WHITH PROJECT	Trees phytosanitary management	Labor	0.0	0.0	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
COST	WHITH PROJECT	Irrigation	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Ramada harvest	Labor	0.0	0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
COST	WHITH PROJECT	Ramada repair	Labor	0.0	0.0	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
COST	WHITH PROJECT	Area cleaning	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Tree pruning	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Fertilization	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Harvest	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WHITH PROJECT	Phytosanitary management	Labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WITHOUT	Seedlings	Plant	32.3	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9
COST	WITHOUT	Organic fertilizer	100 lb.	24.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4
COST	WITHOUT	Cabbage	Ounces	4.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
COST	WITHOUT	Lettuce	Ounces	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
COST	WITHOUT	Carrot	Ounces	1.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
COST	WITHOUT	Onion	Ounces	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
COST	WITHOUT	Sweet pepper	Plant	12.9	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
COST	WITHOUT	tomato	Plant	10.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
COST	WITHOUT	Machete	Unit	1.6	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
COST	WITHOUT	Rake	Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COST	WITHOUT	Shovel	Unit	4.9	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
COST	WITHOUT	Bar/stick	Unit	6.8	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
COST	WITHOUT	Seedlings sowing	Labor	64.6	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5
COST	WITHOUT	Soil preparation	Labor	6.5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
COST	WITHOUT	Soil fertilization	Labor	12.9	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WITHOUT	Transplant	Labor	12.9	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WITHOUT	Weed control	Labor	12.9	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
COST	WITHOUT	Pest and diseases control	Labor	38.8	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
COST	WITHOUT	Harvest	Labor	19.4	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
COST	WITHOUT	Packing	Labor	12.9	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7

5.4 Price of products, inputs and investments

Table 33. Price of products.

INSUMO/PRODUCTO	NAME	UNIT	PRECIO (USD)
I	Wire	roll	29.1
I	Oxen rental	Day	14.6
I	Hoe	Unit	8.9
I	Bar/stick	Unit	17.1
I	Vegetative material for replanting	Unit	0.4
I	Dolomite lime	100 lb.	8.0
P	Sweet potato	ton	320.0
I	Seed sampler	Lt	2.4
I	Silos to storage grains	Unit	114.7
I	Calved cows	Unit	1247.3
I	*Gliricida sepium* o *Bursera simaruba vegetative material*	Posts	0.2
I	Fertilizer	Kg	0.7
I	Fungicide	Lt	9.8
I	Staples	lb.	1.0
I	Herbicide	Lt	4.9
I	Banana plants	Unit	0.2
I	Inputs to treat seed previous sowing	Tablet/pill	0.6
I	Labor	Labor	8.1
I	Machete	Unit	4.0
I	Bended Machete	Unit	14.0
I	Health management/cow	Unit (cow)	74.8
I	Shovel	Unit	12.1
I	Cocoa plants	Unit	1.9
I	Coffee plants	Unit	1.1
I	Plants (Fruit tree)	Unit	2.0
I	Jocote plants	Tree	0.1
I	Plant (for timber production)	Unit	2.7
I	Mango plants	Unit	2.7
I	Nance plants	Tree	0.0
I	Orange plants	Unit	2.0
I	Plumajillo plants	Tree	0.0
I	Service plants	Unit	0.0
I	Post	Unit	1.9
I	Plant material	Unit	0.4
I	Protectant	kg	2.7
I	Tubers and roots	one thousand cuttings	70.0
I	Airtight container to storage seeds	Unit	14.6
I	Seeds	kg	7.8
I	Grass seeds (vegetative material)	tm	22.9
I	Marandú grass seeds	kg	13.0
I	Been seeds	Kg	2.4
I	Maize seeds	Kg	2.2
I	Handsaw	Unit	13.3
I	Pruning scissors	Unit	8.0
I	Transportation	Travel	29.3
I	Seedlings	Plant	0.0
I	Organic fertilizer	100 lb.	4.0
I	Cabbage	Ounces	4.0
I	Lettuce	Ounces	3.4
I	Carrot	Ounces	2.0
I	Onion	Ounces	1.3
I	Sweet pepper	Plants	0.1
I	tomato	Plants	0.1
I	Machete	Unit	4.0
I	Rake		12.1
I	Shovel	Unit	12.1
I	Bar/stick	Unit	17.1
I	Soil preparation (fruit plants)	Plants	1.3
I	Seedlings	Plants	0.0
I	Chayote plant material	Unit	0.3
I	Passion Fruit plants	Unit	0.4
I	Orange plants	Unit	2.0
I	Mango plants	Unit	2.7
I	Avocado plants	Unit	2.7
I	Organic fertilizer	100 lb.	4.0
I	Wooden posts	Unit	3.4
I	Sticks 4m long	Unit	1.1
I	Steel galvanized wire nº 12	lb.	1.1
I	Cabbage	ounces	4.0
I	Lettuce	Ounces	3.4
I	Carrot	Ounces	2.0
I	Onion	Ounces	1.3
I	Sweet pepper	Plants	0.1
I	tomato	Plants	0.1
I	Machete	Unit	4.0
I	Rake		12.1
I	Shovel	Unit	12.1
I	Bar/stick	Unit	17.1
I	Ground corn.	100 lb.	0.0

I	Beans toasting and grounding (canavalia bean)	100 lb.	0.0
I	Leaves dehydrated and grounded(guácimmo o gandul)	kg	0.4
I	Egg shell toasted and grounded	Kg	0.0
I	Sugar	Kg	0.5
I	Cooking salt	Kg	0.2
I	Subtotal inputs	100 lb.	0.0
I	Laying hens	Unit	8.4
I	Medicines	Bottle	11.5
I	Forage Peanut	Kg.	33.7
I	Mill (manual)	Unit	20.2
I	Mesh for henhouse	Linear meters	0.5
I	drinkers, feeders, conveyor to feed the birds	Unit	0.0
I	Posts for a henhouse	Unit	0.0
I	Ground corn.	100 lb.	0.0
I	Beans toasting and grounding (canavalia bean)	100 lb.	0.0
I	Leaves dehydrated and grounded(guácimmo o gandul)	kg	0.4
I	Egg shell toasted and grounded	Kg	0.0
I	Sugar	Kg	0.5
I	Cooking salt	Kg	0.2
I	Medicines	Bottle	11.5
I	Yearly bird replacement	Unit	8.4
I	Organic fertilizer	100 lb.	7.4
I	Pruning shears	Unit	3.4
I	Machete	Unit	8.1
I	Handsaw	Unit	8.1
I	Organic fertilizer	100 lb.	7.4
I	Sacks	Unit	0.1
I	Irrigation and rain water collection system	Unit	141.5
P	Banana	bunch (35-40 units)	2.0
P	Cocoa	kg	1.6
P	Cocoa without	kg	1.6
P	Coffee with	kg	0.4
P	Coffee with	kg	0.4
P	Animal carrying capacity	Lt	0.5
P	Frijol	ton	880.0
P	Jocote	kg	8.1
P	Firewood	m3 st	13.3
P	Timber	Tree	74.1
P	Maize	ton	200.0
P	Mango	Unit	0.1
P	Nance	kg	0.6
P	Orange	Unit	0.0
P	Heifer sale (1 year old)	Unit	324.8
P	Discard cows selling	Unit	584.7
P	Cabbage	Kg.	0.1
P	Lettuce	Pound	0.2
P	Carrot	Pound	0.2
P	Onion	Pound	0.3
P	Sweet pepper	Pound	0.6
P	tomato	Pound	0.5
P	Chayote (4 plants)	Unit	0.2
P	Passion Fruit (4 plants)	Unit	0.0
P	Egg production	Unit	0.1
P	Mango (3 plants)	Unit	0.1
P	Orange (5 plants)	Unit	0.0
P	Avocado (2 plants)	Unit	0.2
P	Cabbage	Kg.	0.1
P	Lettuce	Pound	0.2
P	Carrot	Pound	0.2
P	Onion	Pound	0.3
P	Sweet pepper	Pound	0.6
P	tomato	Pound	0.5
P	Sale of discard birds	Unit	5.4