2013

Technology Innovation Project

Establishment of farmer field school for the Introduction of alley cropping systems to improve soil management and productivity of crops in the Toledo district of Belize

Alliance: Ya`axche Conservation Trust, Ministry Of Natural Resources and Agriculture (Research Department and Extension Department)

April, 2013
Belize C.A

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I. Summary

Project Name	**Establishment of farmer field schools for innovation with alley cropping systems to improve soil management and productivity of crops in the Toledo district of Belize**
Zone	Three communities in the Toledo District, Belize.
Duration	8 months
Beneficiaries	525 corn farmers from the communities of Indian Creek, Silver Creek and San Miguel
Objective	**Overall Objective:** To introduce alley cropping system as a mechanism to improve soil management and productivity in the Toledo district, Belize **Indicators:** • 525 of farmers familiarized with alley cropping systems for soil conservation and management **Specific Objectives:** a) To use participatory approaches (e.g farmer field school) for experimentation with improved alley-cropping technology to improve soil management and productivity in the Toledo district of Belize **Indicators:** • At least 400 farmersfrom San Miguel, silver creek and Indian Creek village participating in the farmer's field school sessions. • 24 experimental plots established with alley farming systems b) To develop with farmer field schools indicative parameters to evaluate the impacts of alley farming practices on soil erosion, fertility and productivity of corn. **Indicators:** • 400 farmers and10 technical familiar with indicators for measuring soil erosion • Measurement for soil cover used as indicator for reduction in soil erosion c) To identify through participatory approaches, the barriers for adoption of alley cropping systems in the Toledo district **Indicators:** • At least 48 farmers interviewed and obstacles to adoption of alley cropping system identified d) To develop a strategy for scaling out of alley farming technology in the Toledo district **Indicators:** • a strategy developed for scaling up of alley cropping technology
Expected Results	**Result1:R 1. Farmers are using alley cropping as part of their soil conservation program.** **Indicators:** • 24 farms established with alley cropping and 525 farmers familiar with alley cropping system • Increase % of soil cover **Result2:System and list of indicators developed and being used to evaluate the impact of alley cropping in soil management and corn production** **Indicators:** • 400 farmers and 10technical personnel familiarized with indicators for measuring soil erosion • Measurement for soil cover used as indicator for reduction in soil erosion

<table>
<tr><td></td><td colspan="4">R3. Experiences in the adoption of alley cropping under FFS systematized

Indicators:
• At least 48 farmers interviewed and obstacles to adoption of alley cropping system identified
• Extension personnel from alliance interviewed.

R4. Strategy developed and used for the scaling up of alley farming technology in Toledo

Indicators:
• a strategy developed for scaling up of alley cropping technology</td></tr>
<tr><td rowspan="2">Budget (Bze$)</td><td>Total Amount</td><td>Red SICTA</td><td>YA`AXCHE CONSERVATION TRUST</td><td>MINISTRY OF NAT. RESOURCES AND AGRICULTURE (ESTENSION DEPARTMENT) And (RESEARCH DEPARTMENT)</td></tr>
<tr><td>$43,677.70</td><td><s>30,983.00</s>27,473.75</td><td>$10,903.95</td><td>$5,300.00</td></tr>
<tr><td>Alliance</td><td colspan="4">Ya`Axche Conservation Trust, Ministry of Natural Resources and Agriculture (Research Department) Ministry of Natural Resources and Agriculture (Extension Department)</td></tr>
<tr><td>Executor</td><td colspan="4">Ya`axche Conservation Trust</td></tr>
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II. Justification

Soil management and conservation has been a problem for farmers in Belize especially for those farmers in the southern part of the country such as in the Stann Creek and the Toledo districts.Much of the agricultural land in the southern region of Belize is currently used for traditional farming based on the slash and burn, bush fallow and shifting cultivation. This is a low productivity but biologically stable system with long fallow periods that can sustain agricultural production for many generations. However, many farmers have shortened or eliminated the fallow period which has resulted in increased soil and land degradation. Research has shown that almost a third of the roughly 1 million acres of agricultural land in Belize occurs on land classified as marginal or unsuitable for agricultural activity. More than a third of all agricultural land in Belize is on acidic soils particularly sensitive to land degradation. Almost a tenth of agricultural activity occurs on steep slopes prone to erosion – mainly in central Belize, such as for instance, along the Hummingbird Highway. What's more, 4% of all agricultural land is located in areas at extreme risk of erosion where high rain up to 4,065 mm annually is recorded. Where lack of land conversion methods is a major cause of land degradation, it is also worth noting that available data indicate that half a million acres (almost a tenth) of the nation's land has been deforested in the past thirteen years, doubling national agricultural cover in a short period of time.

Hence it is important to find viable methods that will mitigate the negative effect of agricultural activity on the environment.Presently Governmental institution and None Governmental Organization are finding ways to mitigate soil degradation and at the same time producing enough crops to maintain food security.

Ya`axche Conservation Trust has proposed an innovative idea of technological innovation to experiment and promote a cropping system that will assist farmers in the southern partof the country (Toledo District) toprotect and conserve the soil and at the same time optimizing their income by obtaining higher yield in their production.This technology involves the incorporation of leguminous and non-leguminous trees in alley cropping systems to reduce soil erosion and improve soil fertility and hence sustainable production.

III. Objectives

Overall Objective:

To improve soil management and productivity of corn through the establishment of alley cropping systems in the Toledo district, Belize

Specific Objectives:

a. To use participatory approaches (e.g farmer field school) for experimentation with improved alley-cropping technology to improve soil management and productivity in the Toledo district of Belize
b. To develop with farmer field schools indicative parameters to evaluate the impacts of alley farming practices on soil erosion, fertility and productivity of corn.
c. To identify through participatory approaches, the barriers for adoption of alley cropping systems in the Toledo district
d. To develop a strategy for scaling out of alley farming technology in the Toledo district

IV. Description of theInnovation

4.1 Alley Cropping

The innovation technology to be introduced and promoted is the use of alley cropping systems to improve soil management and productivity of corn in the Toledo district of Belize. The use of alley cropping systems has proven to give excellent results in many countries such as in Africa and in Central America. Alley cropping system, is a system in whichnitrogen fixing trees such as Inga (*Inga edulis*), madre cacao (*Gliriciia sepium*) and leucaena (*Leucaena leucocephala*) are planted in rows at a certain distance depending on the gradient of the land. The desired crop is then planted between the rows of established trees. This system has allowed farmers to use the same piece of land year after year without degrading the land and the environment. The plant serves as physical barrier and to hold the soil together therefore preventing soil erosion and degradation. In Central America, there has been little adoption of this system although results published showed significant improvements in soil quality or health and in productivity of the system. It should be noted that most of the research on this system has been conducted in experimental plots without taking into consideration of the farmer's local knowledge and their constraints, in addition to the agro-ecological conditions. This project will use an innovative approach with the experimentation of alley cropping systems with farmer field schools and will use local and scientific knowledge for the design of the experiments on farms. Farmers will be trained on different indicators for measuring impacts of alley cropping systems on soil erosion and fertility.

Planting of the alley crops

Species of trees to be used will be determined by availability of planting material as well as adaptability to soil type of the target zone. Trees will be established rapidly from cuttings, using stakes of 5-6 months of age, 1.5 m long and with a diameter of 3.5-4.0 cm. If the moisture is adequate, foliage will appear in four weeks. The stakes used will be 1.5-2.5 m long with diameters of 5-10 cm, planted at 5.0 m between rows (distance may vary with the slope of the land) and 2.5 m between plants at 20 cm depth. Plant populations will be 1438 trees / ha. The direction of planting should be east to west to maximize sunlight interception.

A month after planting the legume, corn will be sown in the field at a distance of 0.9m between rows and 0.5 m between plants. As the corn grows the legume will assist as a barrier in slowing down water runoff. When the canopy of the trees gets dense, it will simply be cut and can be fed to livestock or left on the ground to provide organic matter.

Table 1. The characteristic of the plant material selected

Gliricidia Sepium	Characteristic
Growth	From stake in 2 months (Fast growing)
Adaptation	To tropical climate can tolerate 9 month dry season)
Distribution	Central America
Temperature	$20\text{-}30^0$ C
Tolerance	To acid soil (pH4.5)

With respect to table 1, it is important to mention that the cutting will be obtained through donation by different individual actors and farmers in the area as part of the alliance contribution.

The material selected was as a result of its presence in the area and the tremendous results that it has produced in other countries therefore the purpose to disseminate this innovation is of great priority.

4.2 Agricultural Practices available

Based on the problems that the farmers are encountering in the Toledo district with soil management and conservation, it is necessary to disseminate information on the use of innovative technology that will mitigate the problem of soil degradation. The practices that will be used to disseminate and to promote soil conservation are as follows:

1) Planting density of crops
2) Use of Madre cacao as alley cropping
3) Good agronomic practices.
4) Cost production records

4.3 Environmental Impact.

The establishment of alley cropping systems in contours of sloping lands will result in reduction of soil water runoff and erosion rates compared to alley cropping systems. It will also contribute to improve infiltration rates and hydrological functions of the system. Deep rooted and nitrogen fixing trees and shrubs planted in alley cropping systems will be involved with Nitrogen fixation and increased soil organic matter and carbon stocks of soils. At a landscape level, alley cropping system will be involved with increased and sustainable corn and bean production, and in a reduction in the clearing of forested land to increase levels of production in traditional corn and bean production systems. Permanent alley cropping systems will also have positive impacts on the environment by reducing the frequency of the use of fire for land clearing

V. Characterization of Target Groups

The Project targetsa group that consists of well organized small scale farmers involved in corn production and technical personnel of different organization involved in the value chain of corn production in the area where the project is to be executed. The following is the description of the target groups:

5.1 Farmers

The group of farmers consists of525corn farmers in the community of San Miguel, Silver Creek and Indian creek in the Toledo District.The farmers in these villages are classified as subsistence farmers since their priority is to produce corn to supply their consumption and any excess is sold locally to obtain financial support. Farming is done by the entire family and family members have different functions in the farming systems and value chain of beans and corn, for example, men and younger members of the family are involved in planting and harvesting of crops, while women are generally involved in shelling and processing of corn in addition to household activities.
Average farm size is 7 ha and most of this area is used for cultivation of corn and beans and cacao. Most of the participating farmers have 20 year leased land.

Most of the land topography in the Toledo district has a high elevation due to the presence of mountains.

The farmers in this region use local corn seed known as Creole corn for its high tolerance of disease. Farmers select corn seeds using the following criteria:

- Corn ear is well formed (not deformed)
- Corn ear is large (big) with good grain
- Grain rows are well align
- Only grain found at the center are used (grain found At the tip and at the based are thrown)

Corn in the Toledo district is planted twice a year: the first production cycle is from May-September and the second cycle is from December to March. Farmers in the region do not have access to improved technology because of absence of a viable extension services. Lack of technological innovation is reflected in low yield of corn which is about1,121 kg/hawhich is very low compared to an average production of 1,964 kg/ha which can be obtained using better farm practices. Recently with the presence of NGOs in the area, there is an interest to promote technological innovation for increased yields and sustainable production.

Table 2. Target Groups and location

Convergence Center	Organization	Community	Farmers
Indian Creek Village	Ya`axcheConservation Trust	Indian Creek Village Toledo District	525
TOTAL			**525**

5.2 NGOs.

The project will support NGOs in training of their Technicalpersonnel/ ExtensionOfficer on improved methodologies and technologies for sustainable corn production. They will also be trained on the use of tools for monitoring and evaluation of the impacts of alley cropping systems on soil and productivity paramaters. Finally, the project will work with the NGOs to develop a plan for scaling out the project results and to obtain sustainability of the project

Table 3, below shows that there are only 5 technical staff available to carry out technology transfer work in the target zone. Two people are assigned to corn and beans from the Ministry of Natural Resources and Agriculture (MNRA) and three from Ya'axche.

Table 3. No. of technical Personnel Available in the Target Zone

No.	Institution	No. Technicians
1	Ya`axche Conservation Trust	3
2	Ministry of Natural Resources and Agriculture (Extension Department)	1
3	Ministry Of Natural Resources and Agriculture (Research Department)	1
Total		**5**

5.3. Public sector.

The project will work to strengthen the Ministry of natural resources and agriculture research program to conduct research on improved technologies for sustainable corn production using participatory methodologies. It will train researchers on the use of improved technologies and methods on alley cropping systems

VI. Operational Strategy forthe Disseminationof Technology

6.1 The Farmer Field School (FFS)

The dissemination of the information on alley cropping will be done through the establishment of farmer field schools (many FFS will be established) in the community of Indian Creek, where farmers will participate in different module session imparted by technical personnel of different organization which the alliance will select. This process involves the concept of practical learning where by farmers actively participate by doing hands on activities and teaching in an informal environment.Exchange field visits will also be carried out for farmers to physically observe the benefits of the technology.

The FFS is an experiential training methodology based and on the principles of adult and discovery based learning, through observation and experimentation, analysis of results, and group decision making, in order to develop skills and abilities in the producers and their families (Groeneweg et al., 2007).FFS focuses on issues that are important to producers and are oriented to problem solving and generating improved welfare for farm families. Generally FFS includes groups of 15-30 farmers who meet regularly for a defined time to validate or learn new methods of production through the guidance of a facilitator. In crop production, FFS are carried out based on the duration of the crops; the level of schooling is not a limitation. It also promotes the participation of other household members (spouses, children and others).

The FFS will be implemented using the following processes;

1. The identification of producers: Criteriawill be defined to select the participants of the FFS, for example, interest and desire to improve as well as the interest to invest time and resources in changes.

2. Induction on the FFS: This should be developed through a meeting with the producers as to what is a FFS, how it works and what is needed from each person involved to achieve its objectives.

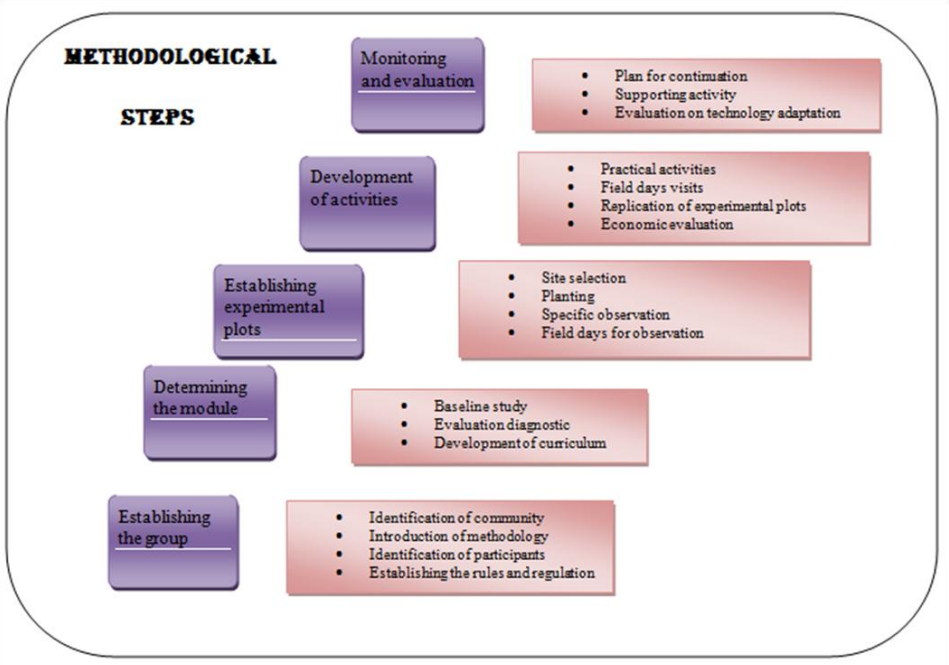
3. Development of a Farm Plan: this is a description of the activities and attitudes to be considered on the farm.
4. Curriculum developmentfor the FFS: analysis of farm, community needs will identify the issues that need to be overcome to strengthen the capacity of the farmer.

5. FFS Implementation: this is putting into effect the curriculum or teaching - learning and experimentation in the FFS and it is conducted by technical personnel or specialist.
   - The learning session: Meeting whereby information and knowledge is shared and exercises are carried out to promote discovery and observation.

   - Experimentation: this takes place after the training session and consists of applying the knowledge acquired in the training session; each producer should carry out tests on his farm

6. Monitoring and Evaluation: At the end of the year a gathering should be held with all the producers to discuss FFS learning, the progress in training and experimentation, as well as how to define the plan for next year. For this phase, a farm plan is used to identify the level of progress as well as the training and experimentation that was developed at the beginning.

Diagram 1. Methodology for establishing the Field School



A convergence centre will be identified in the respective village and be geographically located where it will be readily accessible to all the participants for specific trainings carried out. In each

convergence centre the alliance will identify the farmer and the site where the experimental plot will be established. The farmer will be in charge of managing the plot with the assistance and guidance of the members of the alliance. Technical assistance will be providedprimarilybytechnical members of the alliance or technical expertise brought through the alliance. These Technical personnelwill provide informationabout the materialstested, their specific characteristics and requirements for obtaining better impact of the technology

6.2 Field Days

Field day will be planned by the alliance and the farmers involved in the field school, this will enhance and stimulate the learning desire of thetechnicians and the farmers through physical observation of field and results obtained. The field days activities will be planned to correspond to the module or session of interest to the farmers being thought

6.3 Pamphlets/brochures

During the different modules or session the elaboration of pamphlets and brochure will be done to provide the farmers with additional written information which can serve as a guide in the implementation of the innovative technology

6.4 Dissemination of information via national media stakeholders

In occasion of events or activities done, media stakeholderssuch as radio television and news paper will be invited for a national coverage for a betterdissemination of the information.

6.5 Documentation and Systemization of results

Farmer will received training in record keeping which will allow them to record all data and information of the farm. Format for this will be developed through participatory approaches in the field school.

6.2 Experimental Plots

Methodology

The project will be implemented in the communityof Indian creek where threegroups will be formed to participate in farmer field schools, with 8 farmers per farmer field school. On each farm, a 1.2 acre plot that is representative of land use for corn production in terms of soils and slope will be selected and baseline information on the plot will be established in terms of: history of cropping system, soil type, vegetation, crop yields etc. On each farm, a paired experimental design will be used such that half of the area (0.25 ha) will be planted with alley cropping system and the other half (0.25 ha) used as control plot (Traditional production system)- a total of 24 plots established with alley cropping systems and 24 control plots.

Leguminous trees will be established as alley crops long the contours in a spacing of 3- 4 meteres between rows depending on the erodobility of the soil and topography of land. An A-frame will be used for determining slope and contour lines. The selection of tree species to be used will consider those existing locally in the area such as *Gliricdia sepium*, *Calliandra sp. Leucaena sp* and *Thitonia sp* and farmer's local knowledge of the species with respect o their adaptation to soil conditions and regrowth capacity. Farmer and extensionist will be involved in the design and planning of their experiments.

Indicative selection criteria to be used for the selection of farms are: willingness of farmer to use his farm as demonstrations, location of farm, and accessibility among others. Each farmer with the assistance of the alliance will manage their own farm.

Variables to Measure in experiment

Indicators will be developed by the farmer groups which will be measured on the plots at the beginning and the end of the experiment and will include the following;

- Percentages of soil cover (plant and mulch). This will be measured using a point sampling method with farmers
- Percent or number of rills and channels on soil surface
- Muddy water runoff
- Organic matter content (soil testing)
- Quantity of soil deposition at farm borders

Data Analysis

Data comparison by percentages and student's t-tests will be used to analyze data collected to evaluate the impact of alley cropping systems in soil conservation. Paired comparison will be made to evaluated differences between alley cropping and traditional corn production systems.

6.3 Survey

The capacity of the groups of the farmers will be built via the workshops so that they have the knowledge to participate in the evaluation of barriers for the adoption of alley cropping systems. Following this, a semi-structured survey will be conducted with farmers in the farmer field school (24) and control group (24 farmers outside the farmer field school). The survey will include questions related to bio-physical and socio-economic conditions that will be favourable or unfavorable for adoption of alley cropping systems. Interviews will also be conducted with extension workers.

VII. Monitoring and Evaluation of the project

The project will develop a participatory monitoring and evaluation systems with the farmer field school and collaborating organization. The project will develop a plan with the methods for monitoring each of the indicators and frequency of measurement. Soil data will be taken at the beginning and end of the project- soil cover will be measured at different stages of the crop cycle and post harvest to evaluate the percentage bare soils. The impacts of farmer field school in

improving the knowledge of farmers on improved alley cropping systems will be evaluated at the beginning and end of the project using a semi-structured survey and workshop with each group to evaluate farmer;s perceptions on the technology and their knowledge.

At the end of the project viable results will be acquired, therefore the validation and verification of the information before and after the innovation is important. Before the project execution or any activities the technical project coordinator with the assistance of Red-Sicta and the member of the alliances will develop a mechanism for recording, reporting, and develop activities to measure the effect achieved. A monitoring and evaluatingsystemwill be implemented based on the logical framework and quarterly reports elaborated evaluate the progress of the project.

7.1 Coordination Committee

A coordinating committee for the purpose of planning, operation and monitoring the activities carried out during the execution of the project will be formed by the following;

One Technical Personnel – Ya'axche Conservation Trust
One Technical officer – Ministry of Natural Resources and Agriculture
Red-SICTA technical Liaison Officer
One Technical officer – IICA Belize

The committee will be directed by the project coordinator and will oversee and provide guidance in the implementation of the activities of the project. The committee will meet on a regular basis to review technical and administrative issues of the project.

The project coordinator

The project coordinator will be designated by the counterpart (Ya'axche) and will have the following main responsibilities;

- Coordinate and manage project work
- Monitor project progress and performance
- Ensure that project outputs are delivered on time
- Manage communication within the project
- Prepare progress, final, and other reports
- Arrange meetings and write the minutes
- Manage project resources, including the budget-

7.2 Base-line Study

The baseline study will be the instrumentwhich will providebaselineindicatorsdefined in the project, it will be used as the starting pointto measure the effectand impactofproject activitieson decreasing soil erosion and degradation. The baseline study involves interviewing farmers in the selected communities that are actively involved in the production of corn and are presently

encountering problem with soil management, to know the numbers of farmers in the community, and their knowledge of the use of this innovative technology and its application.

This will also serve to acquire information on the technology currently used by the farmers in this community for the management of the soil to prevent degradation and to optimize the land use. To know the density of planting, use of fertilizer, variety of seed and the different forms of pest control in use and the total production obtained for every cycle. Baseline data on each experimental plot will be collected in relation to: soil conditions, soil fertility, soil cover, plant and mulch cover, yields etc

7.3 Field Record Keeping

A manual will be designed for the project to keep a record of all activities implemented in the project and will include records of FFS sessions, field visits, open days and data collection from the experimental plots, with the objective of providing one standard format for data collection to facilitate data analysis of the indicators to be measured.

VIII. Logical Frame work

Table 4. Logical frame work

CONCEPTS	INDICATORS	VERIFICATION METHODS	Assumption/Risk
GENERAL OBJECTIVES. To improve soil management and productivity through the establishment of alley cropping systems in corn production in the Toledo district, Belize.	• 525 farmers familiarized with alley cropping systems for soil conservation and management.	• Baseline data • Technical reports • Project Evaluation report	
SPECIFIC OBJECTIVES. a. To use participatory approaches (e.g farmer field school) for experimentation with improved alley-cropping technology to improve soil management and productivity in the Toledo district of Belize	• At least 400 farmers from Miguel, silver creek and Indian Creek villageparticipating in the farmer's field school sessions. • 24 experimental plots established with alley farming systems	• Attendance list • Farm records • Farmer field school reports • Technical reports • Final project report • Field visits	• All farmers will be able to participate in the field days • Strong alliance between stakeholder and farmers • Farmers receptive to the technology. • All materials are available.
b. to evaluate the impacts of alley farming practices on soil erosion, fertility and productivity of corn.	• 400 farmers and 10 technical personnel familiar with indicators for measuring soil erosion • Measurement for soil cover used as indicator for reduction in soil erosion.	• Criteria list for indicators for soil erosion • FFS session report • Data collection sheet	• FFS induction process successful
c. Identify the barriers to adoption of alley cropping systems in the Toledo district	• At least 48 farmers interviewed and obstacles to adoption of alley cropping system identified	• FFS session report • Survey results • Study Final report	• Stakeholders participate in the farm and community analysis
d. To develop a strategy for scaling up of alley farming technology in the Toledo district	• a strategy developed for scaling up of alley cropping technology	• Strategy document	• FFS established and successful
RESULTS:			
R 1. Farmers in the Indian Creek Village using alley cropping as part of their soil	• 24 farms established with alley cropping and 525 farmers	Field reports Ya'axche quarterly report	Materials readily available and farmers receptive to new technology

CONCEPTS	INDICATORS	VERIFICATION METHODS	Assumption/Risk
conservation program.	familiar with alley cropping system • Increase % of soil cover		
A1.1 Hire consultant for establishing FFS methodology	• 1 specialist in FFS hired	ToR developed Contract signed	
A1.2 Identification of key corn farmers and technical personnel to participate in FFS	• 24 key farmers identified and participating in the FFS	• Group session reports • Technical report	
A1.3 Establishment of experimental plots in Farms identified	• 24 0.6 acre plots planted with leguminous crops as alley crops	• FFS reports • Technical reports • photographs	
A1.4 Training of technical personnel on FFS and key specific topics identified by farmers	• technical staff trained in FFS methodology and specific technical topics • 7 technical training imparted	• Training Curriculum developed with farmers • Report on farmer needs • FFS session reports • Attendance list	
A1.5 Field schools carried out with farmers	• 7 FFS sessions carried out in three farmer groups	• FFS session reports	
A1.6 Carry out field days and open days for corn farmers in other communities	• 2 field days carried out	• Attendance list • photographs	
R2. System and list of indicators developed and being used to evaluate the impact of alley cropping in soil management and corn production	• 400 farmers and10 technical personnel measuring indicators for soil erosion • Measurement for soil cover used as indicator for reduction in soil erosion.	• Criteria list for indicators for soil erosion • FFS session report • Data collection sheet	Farmers actively participating in FFS induction process successful
A2.1 Consultation with farmers to develop system for evaluating impact of alley cropping on socio economic indicators and proxies	• At least 24 farmers consulted	• Attendance list • Consultation report	
A2.2 Develop method for monitoring soil erosion within alley cropping system plot and control plots	• List of indicators developed for measuring soil erosion • Data collection sheet developed • Methodology for data collection established • Data collection implemented	• List of indicators • Methodology document • Data collection sheet • Final report on results	
R3. Experiences in the adoption of alley cropping under FFS systematized	• At least 48 farmers interviewed and obstacles to adoption of alley cropping system identified	• FFS session report • Survey results • Study Final report	• Stakeholders participate in the farm and community analysis

CONCEPTS	INDICATORS	VERIFICATION METHODS	Assumption/Risk
A3.1 Community meetings to discuss existing knowledge and attitudes towards alley cropping systems and possible barriers to uptake in Toledo	• At least 48 farmers interviewed and obstacles to adoption of alley cropping system identified • Extension personnel from alliance interviewed.	• FFS session report • Survey results • Study Final report	
R4. Strategy developed and used for the scaling up of alley farming technology in Toledo.	• a strategy developed for scaling up of alley cropping technology	• Strategy document	• FFS established and successful
A4.1 Consultation with farmers, Ya'axché and the Ministry of Agriculture to develop strategy for wider adoption of alley cropping in Toledo	• Consultations held with farmers and extension officers	• Attendance list • Minutes of meetings	
A4.2 Development of a Toledo Alley Cropping Strategy	• Strategy developed	• Strategy document	
A4.3 Dissemination of Toledo Alley Cropping Strategy at local and national level including community meetings, printing and sharing strategy and electronic submission of strategy to relevant organizations	• One open field day • 200 manuals/strategy document	• Attendance list • Printed Strategy manual/document • Sales receipt	

IX. Budget

Table 5. The contribution of the Alliance for the project.

ALLAINCE	CONTRIBUTION					
	CASH		Labor/ tech.assistance			
	U$	%	U$	%	TOTAL U$	%
RED SICTA	27,473.75	63%	0.00%	0%	27,473.75	63%
Ya`axche Conservation Trust	0	0%	**$10,903.95**	24.96%	10,903.95	24.96%
Ministry of natural Resources and Agriculture (Research Department)	0	0%	5,300.00	12.13%	5,300.00	12.13%
TOTAL CASH	27,473.75	**63%**	16,203.95	**37%**	43,677.70	100%

Table 6. Total Budget and Contribution by Alliance

Ya`axche Project Budget and contributions					Contribution		
					Red-Sicta	Ya`axche	MNRA
Activity	**Quantity**	**Cost ($Bze)**	**Total Cost ($Bze)**	**Total Cost ($Us)**	**$US**	**$US**	**$US**
Knowledge transfer and Dissemination			**$37,318.00**	**$18,659.00**	**$18,659.00**	**0**	$0.00
Identification of key corn farmers	1	$400.00	$400.00	$200.00	$200.00		
Carrying field school sessions for farmers	7	$1,600.00	$11,200.00	$5,600.00	$5,600.00		
Training of technical personnel	7	$1,200.00	$8,400.00	$4,200.00	$4,200.00		
Field days	4	$1,666.00	$6,664.00	$3,332.00	$3,332.00		
Designing of technical pamphlets	1	$200.00	$200.00	$100.00	$100.00		
Media stakeholders	2	$200.00	$400.00	$200.00	$200.00		
Technical personnel for conducting training	7	$500.00	$3,500.00	$1,750.00	$1,750.00		
organizing of special events	6	$100.00	$600.00	$300.00	$300.00		
field exchange activity	2	$1,600.00	$3,200.00	$1,600.00	$1,600.00		
Printing of pamphlets	777	$2.00	$1,554.00	$777.00	$777.00		
open day event	1	$1,200.00	$1,200.00	$600.00	$600.00		
Establishment of experimental and dissemination plots			**$20,801.50**	**$10,400.75**	**$4,764.75**	**$4,336.00**	**1300**
purchasing of stakes	9,120	$0.10	$912.00	$456.00		$456.00	
planting of madre cacao/luecaena	24	$60.00	$1,440.00	$720.00		$720.00	
land clearing	24	$30.00	$720.00	$360.00		$360.00	
purchasing of corn seed	267.3	$15.00	$4,009.50	$2,004.75	$2,004.75		

land use	24	$400.00	$9,600.00	$4,800.00	$2,400.00	$2,400.00	
land maintenance	10	$80.00	$800.00	$400.00		$400.00	
Stake transportation	24	$100.00	$2,400.00	$1,200.00			$1,200.00
Corn Seed transportation	1	$200.00	$200.00	$100.00			$100.00
planting of corn crop	24	$30.00	$720.00	$360.00	$360.00		
			$0.00	$0.00			
Monitoring and evaluation			**$29,235.90**	**$14,617.95**	**$4,050.00**	**$6,567.95**	**$4,000.00**
base line study	1	$1,800.00	$1,800.00	$900.00	$900.00		
record keeping	1	$2,000.00	$2,000.00	$1,000.00		$500.00	$500.00
farm visits MNRA	14	$350.00	$4,900.00	$2,450.00			$2,450.00
office rent	10	$200.00	$2,000.00	$1,000.00		$1,000.00	
internet service	10	$200.00	$2,000.00	$1,000.00		$1,000.00	
technicians per diem	14	$200.00	$2,800.00	$1,400.00	$1,400.00		
Fuel cost MNRA	14	$200.00	$2,800.00	$1,400.00	$700.00		$700.00
vehicle	14	$100.00	$1,400.00	$700.00		$350.00	$350.00
Cost of administration service (12%)	1	$7,435.90	$7,435.90	$3,717.95		$3,717.95	
Fuel cost for technicians	14	$150.00	$2,100.00	$1,050.00	$1,050.00		
			$0.00	$0.00			
Totals			**$87,355.40**	**$43,677.70**	**$27,473.75**	**$10,903.95**	**$5,300.00**
Percentage Contribution					63%	24.96%	12.13%
Percentage Total				100%			

X. Disbursement Schedule

Table 7. SUMMARY OF DISBURSEMENT SCHEDULE COOFINANCING by Red SICTA

	CONTRIBUTI0N							
	I DISBURSEMENT		II DISBURSEMENT		III DISBURSEMENT		TOTAL	TOTAL %
	US$	%	US$	%	US$	%		
RED SICTA	**$10,989.50**	**40%**	**12,363.19**	**45%**	**4,121.06**	**15%**	**$27,473.75**	**100%**
DISSEMINATION OF INFORMATION	~~7,692.65~~7,463.60	~~70%~~ 68%	~~8,654.23~~8,396.55	~~70%~~68%	~~2,884.74~~2,798.85	~~70%~~68%	18,659.00	68%
VALIDATION	~~1,153.90~~1,905.90	~~15%~~ 17%	~~1,854.48~~2,144.14	~~15%~~17%	~~618.159375~~714.71	~~15%~~15%	4,764.75	17%
MONITORING, EVALUATION AND SYSTEMATIZATION OF RESULTS	~~1,648.43~~1,620.00	15%	~~1,854.48~~1,822.50	15%	~~618.159375~~607.50	15%	4,050.00	15%
TOTAL	**10,989.50**	**40%**	12,363.19	**45%**		**15%**		**100%**

Red-Sicta disbursement plan for the project.

In reference to **Table 7**, the disbursement plan consists of three phases. The first disbursement will account for 40% (US$~~12,393.20~~10,989.50) of the total contribution given by the Red-Sicta Project and will be done at the moment of signing with the Ya'axche conservation trust. This money is earmarked for doing the baseline study, establishing of the monitoring and evaluation system, experimental plots and initial operation of the farmer field schools.

A second disbursement of 45% (US$~~13,322.25~~12,363.19) plan will be done after the midterm progress report has been submitted and approved. This disbursement will cover expenses for the Farmer Field schools, diffusion of information (printing) and coordination costs.

A third disbursement of 15% (US$~~4,647.45~~4,121.06) will be done at the end of the project upon submittal of the final report and external audit report. Therefore these costs must be taken up by the alliance in accordance to the work plan to ensure implementation of diffusion activities, external audit and activities such as project evaluation and systemization related to the closing of the project.

Con formato: Justificado

XI. Cost Benefit of the Technology.

The farmers in Indian Creek are presently obtaining yields of 1,121 kg/ha of corn, but under the use of this innovative technology the farmers will be able obtain yields of 1964 kg/ha which accounts for an increment of 75% in corn production.

Table 8. The impact of Technology use

Concepts	Without innovation (kg/ha)	With innovation (kg/ha)
Production Volume (kg)	**1121**	**1964**
Unit Price ($ Bze)(kg)	**0.77**	**0.77**
Total Income ($ Bze) (production X price)	**863.17**	**1512.30**
Total Cost ($Bze)	**840**	**1101.2**
Cost/Benefit (income/total cost)	**1.1**	**1.6**

XII. Appendix

Annex 1 Role of the actors in the alliance

Actor	Role
Ya`axche Conservation Trust	• Responsible for the execution of the project • Comply with the activities established by the project. • To participate in workshops and all activities related to the new technology. • To participate in meetings and coordination of activities related to the project. • Support in data collection for technical reports
Ministry of Natural Resources and Agriculture (Extension Department.	• Support in monitoring and evaluation • Designate human resourcesto take ownershipof the technologyand replicate and disseminate to others. • Take advantage of the experimental plot for technology transfer and training • Assist in technical support for the execution of the project. • Participate in training session with the farmers Field School
Ministry of Natural Resources and Agriculture (Research Department)	• Assist in designing of methodology for the experiments • Support in monitoring and evaluation • Take advantage of the experimental plot for technology transfer and training • Assist in technical support for the execution of the project. • Participate in training session with the farmers

Annex 2. Project Execution Plan

Activities	2013											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Ago	Set	Oct	Nov	Dec
Identification of key corn farmers												
base line study												
Establishment of experimental plots												
land clearing												
purchasing of stakes												
Stake transportation												
planting of madre cacao/luecaena												
purchasing of Corn Seed transportation												
planting of corn crop												
Dissemination and transfer of information												
Hire consultant for establishing FFS methodology												
Elaboration of technical pamphlets												
Training of technical personnel (2per month)												
Carrying field school sessions for farmers												
Field days exchange activities												
Consultation with farmers to develop system for evaluating impact of alley cropping on socio economic indicators and proxies												
Monitoring and Evaluation												
farm visits MNRA												
record keeping												
activities for closure of project												