2013

Technology Innovation Project

PARTICIPATORY Evaluation on the Introduction of Leguminous Cover Crops in Slash and Mulch Systems for Sustainable Corn Production in the Toledo District, Belize

ALLIANCE: Sustainable Harvest international, Ministry Of Natural Resources and Agriculture (Research Department, ministry of natural resources and Agriculture (Extension Department)

Abril, 26, 2013
Belize C.A

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1 Summary

Project Name	**Participatory Evaluation of the Use of Leguminous Cover Crops in Slash and Mulch Systems for Sustainable Corn Production in the Toledo District, Belize**
Zone	Santa Therese, San Ben Pointe and surrounding communities in the Toledo District, Belize.
Duration	8 months: (may – December 2013)
Beneficiaries	200corn farmers inthese rural communitiesin the Toledo District.
Objective	**General Objective** Evaluate the use of leguminous crop species for increasing soil fertility and corn productivity in Slash and Mulch Systems in Toledo. **Indicators:** • 24 experimental plots established for evaluations of cover crops • 200 farmers gain knowledge on slash and mulch techniques and benefits **Specific Objectives** a. Evaluate the use of leguminous cover crops for increasing soil fertility (nitrogen content) and improvement of soil structure. **Indicators:** • Presence of nodules on root systems on leguminous crops. • 10 % increase of soil biomass • 0.5 % increase in soil organic matter content • Increase in soil organism activity. • Increase in soil nitrogen content **b.** Evaluate the impact of incorporating leguminous cover crops in production and yields. **Indicator:** 20% increase in corn yields **c.** C. Establish a knowledge management system for the promotion of slash and mulch technology **Indicator:** • At least 200 farmers aware of slash and mulch technology Community baseline data completed • Alliance formed with main actors in corn production • One Corn network established with key actors
Expected Results	**R.1Soil organic matter content and fertility improved through the incorporation of leguminous cover crops** **Indicator (s):** • Increase on the presence of micro-organism activity in the soil • Presence of nodules on root systems on leguminous crops. • % increase of soil biomass • % increase in soil organic matter content

<table>
<tr><td></td><td colspan="5">R.2Corn productivity improved in plots using Slash and mulch system
Indicator(s)
• 20%incorn yields obtained

R3. System developed for information management and dissemination.

Indicator (s)
• At least 200 farmers aware of slash and mulch technology Community baseline data completed
• Alliance formed with main actors in corn production
• Corn network established and operational</td></tr>
<tr><td rowspan="2">Budget (Bze$)</td><td>Total Amount</td><td>Red SICTA</td><td>SUSTAINABLE HARVEST INTERNATIONAL (SHI)</td><td>MINISTRY OF NAT. RESOURCES AND AGRICULTURE (ESTENSION DEPARTMENT AND RESEARCH)</td><td>FARMERS GROUP</td></tr>
<tr><td>$51,083.00</td><td>$30,983.00</td><td>$11,050.00</td><td>$2,950.00</td><td>$6,100.00</td></tr>
<tr><td>Alliance</td><td colspan="5">SUSTAINABLE HARVEST INTERNATIONAL (SHI), MINISTRY OF NATURAL RESOURCES AND AGRICULTURE (Research Department) MINISTRY OF NATURAL RESOURCES AND AGRICULTURE (Extension Department) and FARMRS GROUP</td></tr>
<tr><td>Executor</td><td colspan="5">SUSTAINABLE HARVEST INTERNATIONAL</td></tr>
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2 JUSTIFICATION

Intensification of land use in agriculture practices in Belize, has led to a decline in soil fertility and crop yields. Soil quality is at risk from a number of threats driven by a range of man-made and natural pressures including climate change, land use and land management practices. Human activities have changed the character and quality of our soils over time. Destruction of the protective vegetation cover for long periods of time, lack of good agricultural practices and incorporation of technology to assist in soil management has had a tremendous negative impact on soil fertility. All of these activities can impair, or even destroy, the ability of soil to carry out its essential functions.

When land is degraded, its productivity is reduced and may continue to decline unless steps are taken to restore the soils and prevent further losses. Unchecked land degradation may result in an almost total loss of the productive capacity of the land. Hence it is necessary to find environmentally friendly methods that will solve soil fertility problems and enhancing the agriculture sector in Belize. Sustainable Harvest International (SHI), an organization that has been promoting sustainable agricultural systems that are environmentally friendly, has taken the task to implement the innovative technology of the Use of Leguminous Cover Crops in Slash and Mulch Systems for Sustainable Corn Production.

The slash and mulch system is currently being used by small scale farmers in the neighboring country of Guatemala. This technology has been promoted by conservationist groups and has been adapted by Guatemalan farmers after seeing the positive results it has on the soil conservation and production. Based on research done by Milton Flores of CIDICCO in Honduras, even without chemical fertilizers, maize yields of 2-4 tons per hectare were obtained using the above system, more than double the national average yields for Honduras. Hillside erosion was also reduced in the region.

3 Objectives

3.1 General Objective

Evaluate the use of leguminous crop species for increasing soil fertility and corn productivity in Slash and Mulch Systems in Toledo.

3.2 Specific Objectives

The project seeks to accomplish the following objectives:

a. Evaluate the use of leguminous cover crops for increasing soil fertility (nitrogen content) and improvement of soil structure.
b. Evaluate the impact of incorporating leguminous cover crops in production and yields.
c. Establish a knowledge management system for the promotion of slash and mulch technology

4 Description of the Innovation

This technology involves the establishment of productive leguminous species (*Mucunapruriens* and *Cannavaliaensiformis*) as a cover crop with the objective such that slash and mulch of these cover crops are practiced before the sowing of the maize crop. The use of this mulch has given excellent results to small scale corn farmers in improving soil fertility, texture, structure and the availability of other minerals and an increased productivity of corn.
The cover crop will be planted in the fallow period 2 months before the crop is established in the field and then slashed and incorporated into the soil. The corn seeds are then directly planted into the mulch covered soil.

a) Planting of the cover crops

A leguminous cover crop (Cannavalia or mucuna) will be planted two months before establishing the desired crop "corn" to ensure good foliage coverage and to be slashed and mulched. The planting distance will be of 60 cm between plants and 1 m between rows, with two to three seeds in a hole in order to obtain higher area coverage hence obtaining a density of 8,138 plants per acre. The plants flower at three months after planting at which time farmers usually incorporate to the soil.However, the plant can be slashed and mulched much earlier depending on the planting density and vigor.

Table 1.Physical Characteristic of Cannavalia and Mucuna

Cannavalia&Mucuna	Characteristic
distribution	In the Tropics
growth	Vigorous growth
Pest	Resistance to pest and disease
Flowers	White with red base
drought	Tolerant
production	High biomass production
shade	Tolerant to shade

Both *cannavalia*and *mucuna*seeds will be obtained through the alliance. The alliance will buy the seeds from farmers in the district.The material selected 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.

4.1 Agricultural Practices available.

Based on the soil fertility problems that the farmers are encountering in the village of Santa Teresa and San Benito Pointe in the Toledo district, it is necessary to disseminate information on the use of this innovative technology that will mitigate the problem of soil fertility. The practices that will be used to disseminate and to promote soil fertility are as follows:

1. Increase in planting density of crops
2. In row planting
3. Use of leguminous cover crops for slash and mulch cropping system
4. Record keeping

4.2 Environmental Impact

The use of cover crops has long been used as an effective method for reducing soil erosion and nutrient recycling in crop lands, reducing the amount of nutrients entering rivers and waterways. Cover crops produce large quantities of biomass providing a high percent of ground coverage. This ground cover acts as a physical barrier minimizing the breaking down of soil aggregates that lead to soil erosion. The ground cover also increases water infiltration thereby reducing surface runoff and leaching. Cover crops has numerous other benefits including improvement of soil quality, pest management, fertility management,

water availability, landscape diversification, and wildlife habitat. The need of using synthetic agro-chemicals such as herbicides are minimized or completely abolished since this system controls weed effectively by suppressing it. Technologies such as this are friendly to the environment since it reduces the use of inorganic products that are harmful to the environment.

5 Characterization of Target Groups

The project targets a group that consists of well organized small scale farmers involved in corn production and technical personnel of different organization involved in 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 consists ofover 200 corn farmers from Santa Teresa and San Benito Pointe and surrounding villages in the Toledo District. The farmers in these villages are classified as subsistence farmers since their priority is to produce corn to supply their family needs and in case of any surplus, to market locally as an additional source of income. .

The farmers in this village have an average land size of 2.5 acres of land planted with corn; some of them use communal land for the cultivation of corn. Most of the land topography in the Toledo district has a high elevation due to the presence of mountains. Farming is done by the entire family, especially the young boys in the family; the women participate in processing of the corn for tortillas.

The farmers in this region use local corn seed known as Creole corn for its high tolerance of disease. Each farmer selects their corn seed by using the following criteria:

- Well formedCorn ears (not deformed)
- Large corn ears with good/big grains
- Well aligned grain rows
- Only grain from the center of the ear are used

Corn in the Toledo district is planted twice a year. The first production cycle is from May to September and the second cycle is from December to March. These farmers don't have the assistance of technical personnel hence no or minimal management practices are being implemented in their farm to maintain good soil fertility for enhancing crop yield. The yield per acre is 1,028 pounds which is very low compared with what can be obtained using innovative technology.

Table 2.Target Group and Location

Convergence Center	Organization	Communities	Farmers
Santa Teresa Village	SustainableHarvest International (SHI)	Santa Theresa,San Benito Pointe and surrounding villages, Toledo District	200
TOTAL			**200**

5.2 Technical personnel, Extension Officer

The group constitutes of technical personnel from various organizations which includes the ministry of natural resources and agriculture: the research and the extension department. Other private organizations and NGOs

Table. 3. Target Technical Personnel

No.	Institution	No. Technicians
1	SUSTAINABLE HARVEST INTERNATIONAL (SHI)	4
2	Ministry of Natural Resources and Agriculture (Extension Department)	1
3	Ministry Of Natural Resources and Agriculture (Research Department)	1
Total		**6**

- The only technical personnel's available from the organizations

6 Operational Strategy for the dissemination of technology

6.1 The Farmer Field School (FFS)

The dissemination of the information on slash and mulch will be done through the establishment of a field school in the community of Santa Theresa, San Benito Pointe and surrounding villages, where farmers will participate in different module session imparted by technical personnel of different organization which the alliance will select. 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: a criteria will 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 development for the FFS: analysis if 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

    - 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.

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 Experimental Plots

Methodology

Twelve randomized paired experimental plots will be established in three farmer groups in the community, twenty-four paired plots per group. 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 slash and mulch cropping system and the other half (0.25 ha) used as control plot (Traditional production system) - a total of 24 plots established with slash and mulch cropping systems and 24 control plots.

Under the Farmer Field School Methodology (FFS) a selection criteria will be developed along with the farmers for the selection of the four farms per group. 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.

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.

The dissemination of the information on slash and mulch cropping system will be done through the establishment of a field school in the community of Santa Teresa and Pointe, where farmers will participate in different module session imparted by technical personnel

of different organization which the alliance will select. Field visits will also be carried out for farmer to physically observe the benefits of the technology.

Variables to Measure

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;

- Organic matter content (soil testing)
- Presence of micro-organisms and activity
- Soil structure
- Soil water retention
- Percent root nodules on plant

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.

7 Monitoring and Evaluation

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 – Sustainable Harvest International (SHI)
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.

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, how much do they know on 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.

7.3 Field Record Keeping

Duringthe execution of the project a record keeping system will be introduced from the beginning of the project. A record of all field activities, management and financial records will be maintained and provided upon request. These records will include information such as number of farmers involved in training during the project, assisted to get better results in their farm in terms of soil conservation and management, cost of production and yield obtained using the innovation technology. A record of the farmer's opinion and perception on the technology and its adaptation and impact will also be maintained.

At the end of the project an external audit will be conducted.

8. Logical Frame work

Table 4. Project Frame work

CONCEPTS	INDICATORS	VERIFICATION METHODS	ASSUMPTION
GENERAL OBJECTIVES. Evaluate the use of leguminous crop species for increasing soil fertilityand corn productivityin Slash and Mulch Systems inToledo.			
SPECIFIC OBJECTIVES. a. Evaluate the use of leguminous cover crops for increasing soil fertility (nitrogen content) and improvement of soil structure.	• Presence of nodules on root systems on leguminous crops. • % increase of soil biomass • % increase in soil organic matter content • Increase soil organism activity. • Increase in soil nitrogen content.	• Soil test (Analysis) • Soil and root observations • Baseline study • Soil sampling for soil organisms.	Well established slash and mulch system. Minimal pest and disease damage and no natural disaster
b. Evaluate the impact of incorporating leguminous cover crops in production and yields.	• 20% increase in corn yields	• Field observation • Harvest data	• Cover crops properly established and mulched on time. • Minimal pest and disease damage.
c. Establish a knowledge management system for the promotion of slash and mulch technology	• At least 200 farmers aware of slash and mulch technology Community baseline data completed • Alliance formed with main actors in corn production • One Corn network established with key actors	• Baseline reports • Attendance list • FFS session reports	Main actors are receptive to de formation of alliances for information management
RESULTS:			
R.1Soil organic matter content and fertility improved through the incorporation of	• Increase on the presence of micro-organism activity in the soil	• Soil analysis results • Farm visits • Visual indicators	Well established slash and mulch system Good weather and No

CONCEPTS	INDICATORS	VERIFICATION METHODS	ASSUMPTION
leguminous cover crops	• Presence of nodules on root systems on leguminous crops. • % increase of soil biomass • % increase in soil organic matter content		natural disaster
A1.1 Gathering of baseline data of experimental plots	• Baseline data of experimental plots collected	• Technical reports • Field data sheets	
A1.1 Through the FFS, select farms/farmers for the establishment of experimental plots	• Selection criteria developed • 24 farms/sites selected	• Criteria list • List of farms selected • FFS sessions	
A1.2Establish leguminous cover crops on experimental plots selected by the FFS.	• Experimental plot delimited • Seeds sourced and planted	• FFS session reports • Pictures • Field visits	
A1.3 Data collection	• Data on soil fertility indicators	• FFS session reports • Soils analysis results • Visual observations • Field data sheets	
R.2Corn productivity improved in plots using Slash and mulch system	• 20% in corn yields obtained	• Farm production Record (farm data) • Field observations	• Good seeds (good growth and germination percentage)
A2.1 establish corn fields on selected experimental plots	• 24 experimental plots established with corn crop	• Technical reports • Quarterly reports	
A2.2 monitoring of experimental plots	• 2 farmer field visits carried out	• FFS session reports • Field visits	
A2.3 Data collection	Data on soil fertility indicators and crop yield collected	• Field data sheets • Technical reports • Soil analysis results • Farm records • Harvest yields	•
R3. System developed for information management and dissemination.	• At least 200 farmers aware of slash and mulch technology Community baseline data completed • Alliance formed with main actors in corn production • Corn network established and operational	• Baseline reports • Attendance list • FFS session reports	Main actors are receptive to de formation of alliances for information management

CONCEPTS	INDICATORS	VERIFICATION METHODS	ASSUMPTION
A3.1 Identify and form alliances and technical coordination mechanism in the corn network	• One alliance formed with key actors in corn production	• Alliance Act document	
A3.2 Establish the Farmer Field School as technology transfer mechanism	• The FFS established in three farmer groups	• Technical report • Consultant report • FFS session report	
A3.3 Elaboration and dissemination of technical bulletins, brochures and manuals.	• 200 technical brochures, pamphlets printed	• Copy of brochures and pamphlets	
A3.4. Carry out regular technical coordination meetings with stakeholders in the corn network	• 4 coordination meetings carried out •	• Minutes of meetings	

9. Summary of the Budget

Table 5.The contribution of the Alliances.

ALLAINCE	CONTRIBUTION					
	CASH		Labor/ tech.assistance			
	U$	%	U$	%	TOTAL U$	%
RED SICTA	30,983	61%			30,983	61%
Sustainable Harvest International – Belize	7,350	14.39%	3,700	7.24%	11,050	21.63%
Project Participants		0%	6,100	11.94%	6,100	11.94%
Ministry of Natural Resources and Agriculture (extension Department		0%	2,950	5.77%	2,950	5.77%
TOTAL CASH	38,333	**75.04%**	12,750	**24.96%**	51,083	
%						100%

Table 7, shows the total cost of the Project and the contribution of each of the members that forms (actors) in the Alliance. 61% of the total project cost comes from Red-Sicta and 39 % is contributed through the alliance in which 21.6% by Sustainable Harvest International (SHI), 11.9% by farmers and 5.7% by the ministry of Agriculture.

10.Disbursement Schedule

Table 6.SUMMARY OF DISBURSEMENT SCHEDULE COOFINANCING Red SICTA

	CONTRIBUTIONS							
	I DISBURSEMENT		II DISBURSEMENT		III DISBURSEMENT		TOTAL	TOTAL %
	US$	%	US$	%	US$	%		
RED SICTA	12,393.20	40%	13,942.35	45%	4,647.45	15%	30,983.00	100 %
DISSEMINATION OF INFORMATION	8673.20	70%	9,757.35	70%	3,252.45	70%	21,683.00	70%
VALIDATION	1,860.00	15%	2,092.50	15%	697.50	15%	4,650.00	15%
MONITORING, EVALUATION AND SYSTEMATIZATION OF RESULTS	1,860.00	15%	2,092.50	15%	697.50	15%	4,650.00	15%
TOTAL	12393.20	40%	13,942.35	45%	4,647.45	15%	30,983.00	100 %

Red-Sicta disbursement plan for the project.

The first disbursement will account for 40% (US$12,393.20) of the total contribution given by the Red-Sicta Project and will be done at the moment of signing with Sustainable Harvest International (SHI). The first disbursement is for establishing of the monitoring and evaluation system, experimental plots and initial operation of the farmer field schools.

A second disbursement of 45% (US$13,942.50) 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) 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.

11. Cost Benefits of the Technology

The farmers in Santa Teresa are presently obtaining yields of 1,121 kg of corn per hectare without any technology in practice, but under the use of this innovative technology the farmers will be able obtain yields of 1,964 kg pounds per hectares which accounts for an increment of 75% in corn production.

Table 7. Cost benefit

Concepts	Without innovation (kgs/Ha)	With innovation (kgs/Ha)
Production Volume (Kgs)	**1,121**	**1,964**
Unit Price ($ Bze)(Kg)	**0.77**	**0.77**
Total Income ($Bze) (production X price)	**863.5**	**1,512**
Total Cost ($Bze)	**840**	**960**
Cost/Benefit (income/total cost)	**1.028**	**1.5**

12.Budget Report and Financing

The total estimated cost of the project is 51,083.00 US$ whereby 30,983 US$ will be granted by Red-SICTA project. 20,100.00 US$ will be contributed by different organization that are members of the alliance. The contribution of the alliance will be through labor, technical assistance and monitoring of the project. Ministry of agriculture will contribute by assigning one (1) technical personnel for extension services. Sustainable Harvest International will contribute through hiring a financial administrator for the management of the money, payment of different services required during the project and other services.

Table 8. Project Budget

Sustainable Harvest International-Belize Project Budget and contributions				Contribution			
				Red-Sicta	SHI-B	MNRA	Project Participants
Activity	**Qty**	**Total Cost ($Bze)**	**Total Cost ($Us)**	**$US**	**$US**	**$US**	**$US**
Knowledge transfer and Dissemination		**$46,166.00**	**$23,083.00**	**$21,683.00**	**$1,200.00**	**$0.00**	**$200.00**
Identification of key corn farmers	1	$1,000.00	$500.00	$200.00	$200.00		$100.00
Carrying field school sessions for farmers	5	$8,600.00	$4,300.00	$4,000.00	$200.00		$100.00
Training of technical personnel	5	$7,000.00	$3,500.00	$3,000.00	$500.00		
Field days	4	$5,000.00	$2,500.00	$2,500.00			$0.00
Designing of technical pamphlets and other promotion materials (info Mgmnt)	1	$24,566.00	$12,283.00	$11,983.00	$300.00		$0.00
Establishment of experimental and dissemination plots		**$19,900.00**	**$9,950.00**	**$4,650.00**	**$1,100.00**	**$0.00**	**$4,200.00**
purchasing of mucuna seeds	800	$2,400.00	$1,200.00	$1,200.00	$0.00		
Purchasing of tools	24	$1,000.00	$500.00	$0.00	$500.00		
land clearing	24	$5,400.00	$2,700.00	$1,200.00	$0.00		$1,500.00
purchasing of corn seed	768	$4,500.00	$2,250.00	$2,250.00			
transportation of mucuna seeds	1	$600.00	$300.00	$0.00	$300.00		
land maintenance	24	$3,000.00	$1,500.00			$0.00	$1,500.00
Transportation of tools	1	$300.00	$150.00		$150.00	$0.00	
Corn Seed transportation	1	$300.00	$150.00		$150.00	$0.00	
Planting of corn crop	24	$2,400.00	$1,200.00	$0.00			$1,200.00
		$0.00	$0.00				

Monitoring and evaluation		**$36,100.00**	**$18,050.00**	**$4,650.00**	**$8,750.00**	**$2,950.00**	**$1,700.00**
Base line study	1	$2,900.00	$1,450.00	$1,200.00	$250.00		
Record keeping	1	$5,000.00	$2,500.00		$1,000.00	$500.00	$1,000.00
Farm visits MNRA	14	$4,200.00	$2,100.00			$2,100.00	
Office rent	10	$3,600.00	$1,800.00		$1,800.00		
Internet service	10	$2,000.00	$1,000.00		$1,000.00		
Field technician M&E	14	$4,400.00	$2,200.00	$2,200.00			
Fuel cost MNRA	14	$1,400.00	$700.00	$0.00		$0.00	$700.00
Vehicle	14	$3,700.00	$1,850.00		$1,500.00	$350.00	
Cost of administration service (12%)	1	$4,000.00	$2,000.00		$2,000.00		
Fuel cost for technicians	14	$4,900.00	$2,450.00	$1,250.00	$1,200.00		
		$0.00	$0.00				
Total		**$102,166.00**	**$51,083.00**	**$30,983.00**	**$11,050.00**	**$2,950.00**	**$6,100.00**
Percentage Contribution				60.65%	21.63%	5.77%	11.94%
Total		**100.00%**					

13.Appendix

Appendix 1 Role of actors involved in the Alliance

Actor	Role
Sustainable Harvest International	• 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

Appendix 2: Sustainable Harvest International Chronogram of activities

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 for both plots													
Purchasing and dissemination of corn seeds and tools													
Planting of corn seeds													
Cleaning of Plots													
Planting of Mucuna Beans													
Harvesting/Marketing of Corn													
Dissemination and transfer of information													
Elaboration of technical pamphlets													
Training of technical personnel													
Carrying field school sessions for farmers													
Field days exchange activities													
Monitoring and Evaluation													
Farm visits MNRA													
Record keeping													
Activities for closure of project													