

115 ARM-059
96924

ENMIENDA No. 23

AMENDMENT No. 23

CONVENIO DE DONACION
PARA PROYECTO

PROJECT GRANT AGREEMENT

entre el

between the

CENTRO AGRONOMICO TROPICAL
DE INVESTIGACION Y ENSEÑANZA
(CATIE)

TROPICAL AGRICULTURAL
RESEARCH AND TRAINING CENTER
(CATIE)

y los

and the

ESTADOS UNIDOS DE AMERICA

UNITED STATES OF AMERICA

para el

for the

PROYECTO REGIONAL DE MANEJO
DE LOS RECURSOS NATURALES Y
DEL MEDIO AMBIENTE (RENARM)

REGIONAL ENVIRONMENTAL AND
NATURAL RESOURCES MANAGEMENT
PROJECT (RENARM)

AGENCIA PARA EL DESARROLLO INTERNACIONAL (A.I.D.)
AGENCY FOR INTERNATIONAL DEVELOPMENT (A.I.D.)

GA No. 596-0150-G-008

3 de marzo de 1995
March 3, 1995

Enmienda No. 23

Convenio de Donación para Proyecto
No. 596-0150-G-008

Título del Proyecto:
Manejo Regional de los Recursos
Naturales y del Medio Ambiente

CONSIDERANDO, que USAID y CATIE firmaron un Convenio de Donación para el Proyecto Regional de Manejo de los Recursos Naturales y del Medio Ambiente (RENARM) el 15 de septiembre de 1989, el cual se modificó por última vez el 6 de diciembre de 1994 (al cual nos referimos como "Convenio"); y

CONSIDERANDO, que la USAID desea agregar fondos bajo la disposición de "buy-in" de este Convenio y desea reprogramar fondos obligados anteriormente;

POR LO TANTO, USAID y CATIE por este medio convienen en lo siguiente:

1. Fondos Adicionales

Para ayudar a CATIE a financiar los costos de ejecución de las actividades acordadas del Proyecto, USAID, de conformidad con la Ley de Ayuda al Exterior de 1961 y sus enmiendas, acuerda donar a CATIE, bajo la disposición de "buy-in" y los términos de este Convenio, una cantidad adicional que no exceda de CIENTO DIEZ MIL DOLARES DE LOS ESTADOS UNIDOS (\$110,000). Estos fondos serán obligados por USAID/Belize. Con este incremento, la cantidad total obligada bajo la disposición de "buy-in" de este Convenio es de OCHOCIENTOS NOVENTA Y TRES MIL

Amendment No. 23

Project Grant Agreement
No. 596-0150-G-008

Project Title:
Regional Environmental and Natural
Resources Management

WHEREAS, USAID and CATIE entered into a Project Grant Agreement for the Regional Environmental and Natural Resources Management (RENARM) Project on September 15, 1989, which was last amended on December 6, 1994 (together referred as the "Agreement"); and

WHEREAS, USAID wishes to add funds under the buy-in provision of this Agreement and wishes to reprogram funds previously obligated;

THEREFORE, USAID and CATIE hereby agree as follows:

1. Additional Funding

To assist CATIE to meet the costs of carrying out the agreed activities of the Project, USAID pursuant to the Foreign Assistance Act of 1961, as amended, agrees to grant CATIE under the buy-in provision and terms of this Agreement an additional amount not to exceed ONE HUNDRED TEN THOUSAND US DOLLARS (\$110,000). This funds will be obligated by USAID/Belize. With this increase, the total amount obligated under the buy-in provision of this Agreement is EIGHT HUNDRED NINETY THREE THOUSAND EIGHT HUNDRED FORTY ONE US DOLLARS

OCHOCIENTOS CUARENTA Y UN DOLARES DE LOS ESTADOS UNIDOS (\$893,841), como se muestra en el Anexo I.

Los fondos adicionales provistos por medio de esta enmienda serán utilizados para proveer asistencia técnica en manejo integrado de plagas al Proyecto de Protección y Manejo de Recursos Naturales de USAID/Belice (NARMAP) como se detalla en los términos de referencia (Anexo II) proporcionados por USAID/Belice.

2. Reprogramación de Fondos

En junio de 1993, por medio de la Enmienda No. 15 del Convenio de Donación entre CATIE y ROCAP, \$60,000 fueron obligados para contratar servicios técnicos para evaluar la tasa de costos indirectos propuesta para los Convenios de USAID. La cantidad de \$30,000 de estos fondos fue obligada por error bajo "Fondos de Desarrollo y Apoyo a Programas", cuando deberían haber sido obligados como fondos de RENARM. Por lo tanto, para corregir este error estamos reprogramando los \$30,000 dentro del presupuesto general de RENARM/CATIE, como se muestra en el "Anexo I".

El total de la Donación, compuesto por el total donado conforme el Convenio original, y sus enmiendas, y esta Enmienda No. 23, no debe exceder de DIECINUEVE MILLONES SETENTA MIL NOVECIENTOS SESENTA Y DOS DOLARES (\$19,070,962) como se muestra en el Anexo I.

(\$893,841) as shown in Annex I.

The additional funds provided by this amendment are to be used to provide technical assistance in integrated pest management to the USAID/Belize Natural Resource Management and Protection Project (NARMAP) as fully described in the attached scope of work (Annex II) provided by USAID/Belize.

2. Reprogramming of Funds

In June 1993, via Amendment 15 of the Grant Agreement between ROCAP and CATIE, \$60,000 were obligated to contract technical services to evaluate CATIE's proposed overhead rate for USAID agreements. \$30,000 of these funds were mistakenly recorded by USAID as "Program Development and Support Funds", whereas they should have been recorded as RENARM funds. We are therefore correcting this error by reprogramming the \$30,000 within the overall RENARM/CATIE budget, as noted in the attached "Annex I".

The total Grant, comprising the amount granted under the original Agreement, as amended, and this Amendment No. 23, shall not exceed NINETEEN MILLION SEVENTY THOUSAND NINE HUNDRED SIXTY TWO DOLLARS (\$19,070,962) as shown in Annex I.

3. Distribución de Fondos

El Anexo I, "Presupuesto Ilustrativo General", adjunto a esta enmienda, reemplaza en su totalidad el presupuesto adjunto como Anexo I a la Enmienda No. 22.

El Anexo III muestra el presupuesto ilustrativo de este "buy-in".

4. Desembolsos y Procedimientos Contables:

Los CIENTO DIEZ MIL DOLARES (\$110,000) adicionales provistos por esta enmienda serán desembolsados por USAID/Belice como se establece en la Sección VI de la Carta de Ejecución No. 1. CATIE presentará comprobantes de pago "vouchers" debidamente ejecutados y claramente rotulados "Buy-In" MIP a USAID/Belice para su pago. CATIE proporcionará a USAID/G-CAP copias de todos los comprobantes de pago "vouchers".

USAID/Belice aprobará los comprobantes de pago "vouchers", planes de trabajo, personal, viajes, informes, compras y documentos y acciones técnicas similares relacionadas con este "buy-in".

5. Plaguicidas:

Los fondos obligados por esta Enmienda no deberán ser usados para la compra de plaguicidas.

3. Distribution of Funds.

Annex I attached hereto, "Overall Illustrative Budget" supersedes and replaces in its entirety the budget attached as Annex I to Amendment No. 22.

Annex III shows the Illustrative Budget for this Buy-in.

4. Disbursements and Accountability Procedures:

The additional ONE HUNDRED TEN THOUSAND DOLLARS (\$110,000) provided with this amendment will be disbursed by USAID/Belize as established in section VI of Implementation Letter No. 1. CATIE will submit properly executed and clearly labeled IPM "Buy-In" vouchers to USAID/Belize for payment. CATIE will provide USAID/G-CAP with copies of all vouchers.

USAID/Belize will approve vouchers, work plans, personnel, travel, reports, procurements and similar technical documents and actions related to this buy-in.

5. Pesticides:

The funds obligated by this Amendment shall not be used for the purchase of pesticides.

6. Terminación de las Actividades:

Todas las actividades deberán ser completadas para la Fecha de Terminación de la Asistencia al Proyecto RENARM, 31 de enero de 1996.

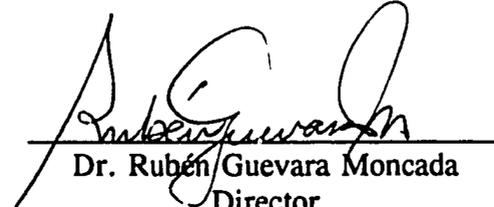
7. Con excepción de las modificaciones efectuadas por este medio, el Convenio permanecerá en plena vigencia.

6. Termination of Activities:

All activities must be completed by the RENARM Project Assistance Completion Date of January 31, 1996.

7. Except as amended hereby the Agreement shall remain in full force and effect.

POR EL CENTRO AGRONOMOICO TROPICAL DE INVESTIGACION
Y ENSEÑANZA (CATIE)
FOR THE TROPICAL AGRICULTURAL RESEARCH AND
TRAINING CENTER (CATIE)


Dr. Rubén Guevara Moncada
Director
CATIE

POR LA AGENCIA PARA EL DESARROLLO INTERNACIONAL
FOR THE AGENCY FOR INTERNATIONAL DEVELOPMENT


William Stacy Rhodes
Director

PRESUPUESTO ILUSTRATIVO
 (DOLARES E.E.U.U.)

RUBROS	PREVIO "LOP" Enm. 22	CAMBIOS	NUEVO "LOP"	OBLIGACIONES		
				TOTAL ANTERIOR Enm. 21	CAMBIOS	NUEVO TOTAL
Personal	11,474,097	0	11,474,097	9,757,623	30,000	9,787,623
Capacitación	2,174,666	0	2,174,666	1,784,378	0	1,784,378
Viajes y Viáticos	1,267,248	0	1,267,248	1,179,359	0	1,179,359
Equipo	1,077,726	0	1,077,726	1,024,909	0	1,024,909
Materiales y Suministros	1,670,393	0	1,670,393	1,644,888	0	1,644,888
Com., Oper. y Servs.	366,208	0	366,208	366,208	0	366,208
Auditorías	20,000	0	20,000	12,532	0	12,532
INFORAT	55,485	0	55,485	55,485	0	55,485
INFORDE	302,957	0	302,957	302,493	0	302,493
Apoyo a política forestal	100,000	0	100,000	5,988	0	5,988
Diseminación de Información sobre tolerancias de pesticidas	<u>28,925</u>	<u>0</u>	<u>28,925</u>	<u>16,727</u>	<u>0</u>	<u>16,727</u>
Sub - total	18,537,705	0	18,537,705	16,150,590	30,000	16,180,590
Gastos Indirectos 13%	2,306,795	0	2,306,795 *1	1,996,531	0	1,996,531 *1
Evaluaciones	0	0	0	0	0	0
Auditoría de Gast. Indirectos	60,000	0	60,000	30,000	(30,000)	0
Contingencias	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
USAID Sub - total	20,904,500	0	20,904,500	18,177,121	0	18,177,121
Buy - ins	<u>2,943,000</u>	<u>0</u>	<u>2,943,000</u>	<u>783,841</u>	<u>110,000</u>	<u>893,841</u>
T O T A L	23,847,500	0	23,847,500 *2	18,960,962	110,000	19,070,962

*1 Esta cantidad no refleja el porcentaje exacto de los incrementos subsiguientes.
 *2 Sujeto a la disponibilidad de fondos de USAID

e las compras directas hechas por el beneficiario para este propósito y al acuerdo mutuo

-CAP no están sujetas a Gastos Indirectos. Las partes de continuar con el Proyecto en la fecha

ILLUSTRATIVE BUDGET
(US \$)

LINE ITEMS	PREVIOUS LOP Amend. 22	CHANGES	NEW LOP	OBLIGATIONS		
				PREVIOUS TOTAL	CHANGES	NEW TOTAL
Personnel	11,474,097	0	11,474,097	9,757,623	30,000	9,787,623
Training	2,174,666	0	2,174,666	1,784,378	0	1,784,378
Travel & Per Diem	1,267,248	0	1,267,248	1,179,359	0	1,179,359
Equipment	1,077,726	0	1,077,726	1,024,909	0	1,024,909
Materials & Supplies	1,670,393	0	1,670,393	1,644,888	0	1,644,888
Comm., Oper. and Serv.	366,208	0	366,208	366,208	0	366,208
Audits	20,000	0	20,000	12,532	0	12,532
INFORAT	55,485	0	55,485	55,485	0	55,485
INFORDE	302,957	0	302,957	302,493	0	302,493
Forest Policy Support	100,000	0	100,000	5,988	0	5,988
Pesticide - Tolerance						
Info. Dissemination	<u>28,925</u>	<u>0</u>	<u>28,925</u>	<u>16,727</u>	<u>0</u>	<u>16,727</u>
Sub-total	18,537,705	0	18,537,705	16,150,590	30,000	16,180,590
Overhead 13%	2,306,795	0	2,306,795 *1	1,996,531	0	1,996,531 *1
Evaluations	0	0	0	0	0	0
Overhead Audit Costs	60,000	0	60,000	30,000	(30,000)	0
Contingencies	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
USAID Sub-total	20,904,500	0	20,904,500	18,177,121	0	18,177,121
'Buy-ins'	<u>2,943,000</u>	<u>0</u>	<u>2,943,000</u>	<u>783,841</u>	<u>110,000</u>	<u>893,841</u>
T O T A L	23,847,500	0	23,847,500 *2	18,960,962	110,000	19,070,962

*1 This amount does not reflect the exact 13 percent as purchases made by USAID/G-CAP are not subject to Overhead

NATURAL RESOURCE MANAGEMENT AND PROTECTION PROJECT
(USAID Project No. 505-0043)

SCOPE OF WORK FOR RENARM/CATIE BUY-IN

I. INTRODUCTION

The Natural Resource Management and Protection Project (NARMAP) is a joint venture between the Government of Belize (GOB) and USAID with technical support provided by World Wildlife Fund under a cooperative agreement.

The goal of NARMAP is to protect and manage the natural resources upon which the sustainable economic and social development of Belize depends. Its purpose is to improve conservation management in order to increase and sustain the economic benefits from agriculture, forestry, and fisheries.

Although Belize is endowed with a rich diversity of natural resources, the need to achieve a balance between economic development and conservation is urgent. Belize has depended on its exploitable natural resources for economic growth without making the investments or taking the precautions needed for sustainable extraction. High population growth, including an influx of refugees from neighboring countries, and an expanding economy are straining natural resource renewability levels. Evidence also suggests that the cycle of deforestation and environmental degradation present elsewhere in the region will be repeated in Belize if interventions are not adopted.

The NARMAP Project was designed to help define and implement a strategy, policies and regulations for environmental protection and natural resource management; develop data collection and analysis capability for environmental monitoring, planning and management; introduce sustainable alternative cropping systems in critical areas; establish a comprehensive system of protected areas based on enhanced land use planning; and expand public awareness and investment in conservation.

The NARMAP Project is comprised of three principal technical elements--environmental planning and monitoring, sustainable agricultural production, and forestry development. Two elements, private voluntary organization (PVO) project support and project coordination and management, provide implementation support for the three technical components.

Under the **Environmental Planning and Monitoring** element, the ability of the GOB to monitor key indicators of environmental quality, assess environmental impacts of development projects and enforce compliance is being improved. Environmental policies are being clarified, realigned and more effectively coordinated between

Government entities. The policy and regulatory foundation is to orient field interventions and prioritize activities proposed under the project components, particularly forestry development.

The second element, **Sustainable Agricultural Production (SAP)**, is bringing the combined efforts of improved land use planning, alternative cropping systems, soil conservation practices and integrated pest management to bear on the problem of deforestation and environmental degradation caused by declining agricultural productivity. Technologies are being developed and extended to areas where farming represents a problem for forestry and/or conservation management.

The SAP program is being implemented by the Ministry of Agriculture (MOA) with technical support provided by Winrock International Agricultural Institute (WIAI). Activities under the SAP program include integrated pest management (IPM), agroforestry, in collaboration with the Forest Department (FD), and income generation through the diversification of cropping systems.

Under the third element, **Forestry Development**, assessments of critical areas supported by the British ODA's analysis of remote imagery are guiding field interventions and establishing the baseline needed for a response to the rate of deforestation, establishment of immutable boundaries of forest reserves and protected areas, and the extent of the production forest. Efforts are also concentrating on defining and consolidating the boundaries of forest reserves and protected areas and managing them effectively.

NARMAP intends to seek the support of CATIE to implement three activities on behalf of the MOA and the FD of the Ministry of Natural Resources (MNR). This will be achieved through the existing buy-in mechanism of the USAID/RENARM Project.

II. INTEGRATED PEST MANAGEMENT PROGRAM FOR MAJOR VEGETABLE CROPS

BELIZE BACKGROUND INFORMATION

A Baseline Survey conducted by the SAP program in 1993 reported 55% of the farmers south of the Western Highway in the Cayo District (SAP target area) grow vegetables for commercial production. The average vegetable grower grossed in excess of Bz \$4100/year from fresh produce sales. Vegetable production accounts for approximately 30% of all gross farm income in the survey area. Tomatoes, cabbage, watermelon and sweet peppers are the most popular crops. Tomatoes are by far the most important commodity in terms of income generation followed by sweet peppers.

There exist communities within the target area where vegetable production is the principal or the only farming activity. The

Seven Mile area is comprised of approximately 30 vegetable growers - mostly immigrants from El Salvador and Guatemala. The Succotz/Negro Man region has about 15 full-time vegetable growers. The Valley of Peace is a refugee community and has approximately 25 commercial vegetable growers. In addition, there are another 30 growers scattered throughout the Barton Creek area. There are an estimated 250 vegetable producers in the entire SAP target area within Cayo District.

In addition to the Cayo District, vegetable production accounts for about 10% of gross farm incomes in the SAP target area of Toledo District. Vegetables are also cultivated on a smaller scale in the target area in Stann Creek District. Vegetables are also widely grown outside of the SAP target areas, principally in northern Belize.

Improving vegetable production has the potential for increasing farm incomes and enhancing natural resource utilization. More intensive vegetable production under proper management can generate high incomes on relatively small areas. Additionally, judicious use of inputs, especially pesticides, would enhance the sustainability of the production system with less negative environmental impacts. In these contexts, improving vegetable production is directly related to SAP's objectives of reducing encroachment of agriculture into protected areas, increasing rural incomes on a sustainable basis and protecting the environment.

Improved vegetable production would benefit farmers throughout the SAP target areas. However, the primary beneficiaries would be small farmers in the Cayo District. The potential impact could be nationwide since improved technologies developed in one area may be applicable to other areas with only minor modifications.

Current Situation in Cayo District

From interviews with farmers for the SAP Baseline Survey, it was evident that most vegetable growers were experiencing serious problems in pest management. Farmers depended exclusively on chemical control of pests which are becoming more difficult to manage. The large amount of pesticides being employed raises concern about the sustainability of vegetable production and the effect of pesticide abuse on human health and the environment.

The importance of vegetables to the farm economy of the Cayo District and the negative impacts pesticide abuse can have on the environment and human health resulted in the need to conduct a more thorough analysis of pesticide use in vegetable production. This was done in two forms; a structured survey on pesticide usage in tomatoes and sweet peppers followed by field observations and discussions with farmers cultivating other vegetable crops.

Survey of Pesticide Usage in Tomatoes and Sweet Peppers

In August 1993, the SAP team conducted a study to document pesticide usage in the two most important vegetables of the Cayo District; namely, tomatoes and sweet peppers. The study focused on determining the pesticides most commonly used and frequency of application, estimating the cash layout for pesticides in the current pest control methods, and the farmers' rationale for use of pesticides. The following paragraphs summarize some of the results of the survey.

1. Farmers used thirteen different insecticides and 7 fungicides during the cropping season. Insecticides are the most frequently used pesticide.
2. The most frequently used insecticide was methamidophos (Tamaron), used by two-thirds of the farmers. Tamaron is listed as a restricted pesticide by the Pesticide Control Board (PCB) due to its high toxicity. Synthetic pyrethrins, e.g., Decis, Ambush, etc. are commonly used. These compounds have low mammal toxicity but little insect selectivity. Endosulfan (Thiodan) was used by one-third of the farmers. The chemical is not registered for use or sale in Belize. Its origin is most probably Guatemala.
3. Fungicides are used less frequently than insecticides and applications are concentrated on seed beds and normally mixed with insecticides. Metalaxyil (Ridomil) was the most frequently employed fungicide followed by proineb (Antracol). Other fungicides used were benomyl (Benlate), chlorathalonil (Bravo), mancozeb (Manzate), copper oxide (Cupravit) and Champ.
4. All farmers indicated they followed scheduled spray programs (prophylactic applications). Applications were scheduled anywhere from once a week to every other day. Seventy-eight per cent of farmers applied a preventive application once a week and 22% were on "an every other day" spray regime. Farmers could not explain why some applications were weekly and others more frequent.
5. Farmers who applied insecticides on a weekly basis applied a total of 12 applications to tomatoes and 21 to sweet peppers. Farmers using an every other day spray program applied a total of 42 insecticide treatments to tomatoes and 75 to sweet peppers. The weighted mean number of insecticide applications per crop was 18.6 in tomatoes and 32.9 in sweet peppers. These numbers reflect the severity of pesticide misuse.

Direct Cost of Pesticide Usage

Farmers applied such a range and combination of products that it is difficult to calculate precisely the monetary value of current pest

control programs. However, estimates can be derived that illustrate the range of costs for pest control measures. The costs shown are for repeated applications of a single chemical but such a practice is seldom followed. However, the information illustrates the tremendous range of costs and the feasibility of reducing chemical costs if farmers knew which products to select for controlling a particular pest.

By taking into account the frequency of use of a particular product and the weighted mean number of applications/crop, it is feasible to derive an estimate of amount of capital expended on insecticides. The average cost for the product in an insecticide application was estimated at Bz\$14.06/acre. The average number of applications per crop was 18.6 for tomatoes and 32.9 for sweet peppers. Therefore, insecticides alone cost the farmer approximately Bz\$262/acre in tomatoes and Bz\$464/acre in sweet peppers.

Farmer Rationale for Use of Pesticides

The greatest fear of farmers in the survey area is the Geminiviruses, a white fly transmitted virus complex that attacks solanaceae species. The virus causes extensive damage to tomatoes and peppers, and to a lesser extent, eggplants. There is no evidence to support the practice of controlling the vector in order to reduce the incidence of the virus. Farmers state that continuous applications (every other day) of pesticides have not reduced damage caused by the virus.

It is also apparent that farmers are unaware of the transmission of the virus from old plants or debris to new plantings or seed beds. Farmers often plant crops in sequence resulting in young seedlings planted next to mature, virus infected plants. Seedling nurseries are often located adjacent to heavily infected production fields.

All farmers follow a prophylactic application spray program which does not have a rational or biological basis and is dangerous. Insect resistance, resurgence, and elevation of minor pests to major pests are most often the result of improper prophylactic applications.

In general, the doses employed are within the range of recommended rates and not excessive. However, there is a tendency for farmers to increase the doses over time as the chemical is said "to lose its effectiveness". In addition, the simple fact that farmers change chemicals indicates that the effectiveness of certain chemicals is perceived to be decreasing after repeated use. There is no confirmation of insect resistance but it would be reasonable to assume that resistance is an eventual outcome of repeated prophylactic applications.

Tamaron is the most widely used product even though it is one of the most toxic products available and some farmers claimed they dislike it because of the smell and it made them dizzy. Farmers who were not using Tamaron had used it in the past but were forced to find alternatives since they noticed that it was no longer effective.

The cost of a product appears to be only one criteria for selecting a particular chemical. Farmers claim they apply Tamaron mainly because it is one of the least expensive products even though most farmers are aware that it is a highly toxic compound. In contrast, the synthetic pyrethrins, e.g., Ambush, and Decis, are among the most expensive products, but farmers prefer them because of their low toxicity. The ability of a particular chemical to selectively control a pest is not considered in the decision making process.

Wide spectrum control is the objective of most farmers. According to the baseline work thirty-four per cent of the farmers rotated various products to achieve this goal. A few farmers made "cocktails" employing as many as three products in the same application in order to obtain broad spectrum insect control. Wide spectrum insect control is in complete contrast to the concept of selectively controlling the targeted pest(s) - an essential component of integrated pest management.

Observations on Other Vegetables

Pesticide abuse is not limited to tomatoes and peppers. Prophylactic insecticide applications are also used on other vegetables, e.g., watermelon, cucumbers, etc. Additionally, much confusion exists between disease and insect damage. Many farmers spray insecticides to control fungal disease. This is particularly true in crops like watermelon and cucumber where disease problems are common.

Farmers give little, if any, attention to applications near harvest time. This is true for all crops. It is common to observe farmers spraying a highly toxic chemical with long residue activity near or at harvest time. The potential toxicological risks associated with this practice are largely ignored.

However, as desperate as the situation is, there are indications that farmers can adopt improved pest management practices when given adequate advice and training. A case in point is the use of commercial formulations of the bacteria *Bacillus thuringiensis* (Bt) to control the diamond back moth in cabbage. A few selected farmers were introduced to this technology in training courses, and the use of Bt has been extended to other farmers. The use of Bt is now widespread in cabbage, and overall insecticide usage has been reduced.

Conclusions

Survey information, on-site assessments and discussions with farmers and extension personnel provide in-depth knowledge of the problems in pest management in the most important vegetable crops. The problem-identification phase permits the development of a program to address the priority issues. The conclusions in regards to current difficulties in pest management and the need for addressing these deficits are divided into four areas.

1. Lack of decision making criteria at the field level. Prophylactic applications are the norm due to the fact that farmers have not been provided with alternatives. Farmers have not been instructed on field monitoring, threshold levels, and the selective use of pesticides;
2. Absence of educational aids for both the farmer and extension personnel. Pest and insect identification guides are not available. All insects are viewed as pests as evidenced by the desire to obtain wide-spectrum insect control. Farmers and often extension staff have difficulties distinguishing insect damage from disease symptoms;
3. Limited knowledge of risks associated with pesticides. Farmers routinely spray and harvest simultaneously. Precautions during applications are seldom used. Point-source contamination of water sources is evident as farmers prepare tank mixes near water sources; and
4. Inadequate appreciation of cultural practices as preventive measures in pest management. Farmers expose seedling nurseries to infection by planting near infected fields. Crop rotation is not practiced. Plant debris is permitted to remain in harvested fields providing inoculum for viruses, diseases and insects.

OVERVIEW OF CATIE'S PEST MANAGEMENT PROGRAM

CATIE's interest and experiences in plant protection dates back to the origin of the institution in the 1940's and has remained one of the central themes of the institution. In 1984 CATIE consolidated various disciplines into a common Plant Protection Area. Further consolidation has developed, resulting in the formation of a division of Sustainable Tropical Agriculture within which the Integrated Pest Management (IPM) program operates.

CATIE's IPM program is a holistic approach to pest management that incorporates various disciplines into a common effort. The program includes pathologists, weed specialists, entomologists, and agronomists. The interdisciplinary group of specialists functions on a regional level throughout Central America. The IPM program

gives priority to problems that are common to the region. Belize has recently become a member of CATIE's regional program.

CATIE's IMP program has made contributions in research, education, technology transfer, documentation and information distribution. The research program has identified technologies that provide alternatives for integrated management of the major pest problems. Major emphasis has been given to vegetable crops. To facilitate the transfer of technologies generated, the IPM program established the Regional Integrated Pest Management Information and Communication Center. The Center produces and disseminates specialized publications and printed materials such as the "Integrated Pest Management Journal", the "IPM Informative Bulletin", "IPM Current Contents", the "IPM Information and Documentation Series" and the periodical "IPM Readings for Extensionists". In addition, the Center prepares and distributes IPM guidebooks for several crops, books, posters and brochures about the management of important pest problems and complexes in key crops.

The Center has also identified and maintains regular contact with more than 1500 individuals and institutions from within and outside of the region, through its specialized services in specific areas of interest such as pesticides, entomology, plant pathology, weed science, nematology, acarology and socio-economics.

More recently, the Center has developed a Bulletin of Registered Pesticides for use in both export crops and domestically consumed crops. The information in the bulletins includes actualized crop-specific listings with parameters such as toxicity, restrictions, special handling and application considerations, days-to-harvest, and residue tolerances for EPA approved products.

CATIE's IMP program has also been instrumental in establishing and providing support to the Regional Plant Protection Network. The Network is totally functional in Guatemala, El Salvador, Honduras, Costa Rica and Panama. Efforts are underway to consolidate the Network in Nicaragua. The Network consolidates a total of 345 plant protection specialists; among whom 100 are extensionists, 143 are researchers and 102 are professors. The group is affiliated with 46 institutions from the Central American region.

CATIE's experienced technical staff, its regional focus, support from an established documentation center, experience in communications, training facilities and its leadership in establishing and consolidating regional networks provides CATIE with a comparative advantage in development of regional programs in pest management.

PROPOSED AREAS OF COLLABORATION BETWEEN BELIZE AND CATIE

CATIE's assistance is required to address the problems already identified as priority issues. The collaborative project activities will focus on overcoming deficiencies in decision making criteria, absence of instructional aids, knowledge of risks associated with pesticide use and lack of knowledge and use of cultural practices as a component of IPM. CATIE is uniquely qualified to assist in this endeavor due to their long history of researching and collaborating with other institutions on regional pest management problems. The specific areas of CATIE involvement are listed below:

A. Extension Bulletins

The first step is to introduce to Belizean farmers known technologies that CATIE or its regional cooperators have generated and/or disseminated to farmers. Information dissemination will commence in the form of extension brochures. The target audience of the technical bulletins is the farmer; consequently, the bulletins should be prepared simply and contain only pertinent information with colored photographs of major insects and pests. These bulletins will address the immediate problem of lack of information on part of the farmer to make a decision on pesticide use.

The bulletins will provide color photographs for identification of major insects for the particular crop, procedures for monitoring, economic thresholds and recommendations on control measures. The extension bulletins will also contain photographs of major pathogens. Control measures (including preventive practices) will be included. The bulletin will be restricted, to avoid confusion, with each bulletin containing no more than four insects and four diseases.

The extension bulletin will be in the form of 7 brochures of one-half page size. For simplicity, the brochures should be as short as possible, e.g., maximum of ten half-pages printed on both sides. Bulletins will be prepared in both English and Spanish. Approximately 250 copies of each language will be printed initially. Brochures will be prepared for tomatoes, peppers, watermelon, cucumber and cabbage. Following the on-farm evaluations, the brochures will be modified (if necessary) and another 500 copies in each language will printed by CATIE.

The information required for the bulletins is available at CATIE and much has already been assembled in the crop guide books including photographs. However, the guide books were directed to profession staff, and as such, are too technical and detailed for use by most farmers. Essentially, the extension bulletins will be condensed versions of the crop guide books. In addition to the

five crop guide bulletins, a sixth brochure is required to describe critical cultural practices as a component of IPM. A seventh brochure will provide information on risks of pesticides. Information on time to harvest, human toxicity, selectivity, etc. will be provided. Information for this bulletin can be extracted from CATIE's Bulletin of Registered Pesticides but presented in a form that is easily understood by a farmer.

It is estimated that 5 person-days will be required to prepare each extension bulletin. A total of 35 days will be required to prepare all 7 bulletins. Translation into the second language will add one day to each brochure making a total of 42 person-days to complete this task.

B. In-country Training

Extension staff both in the MOA and NGO community require training in order to deliver the pest management message. Training will come in the form of a series of short courses involving classroom lectures, field demonstrations and on-farm activities involving selected farmers. Training should be programmed in phases in order for field staff to fully participate. Training sessions should be interactive, comprehensive and have a means of accountability. Participants will be expected to master each phase before proceeding to the next level. It is estimated that 3 (three) courses, each with a duration of 3 (three) days, will be conducted over a two month period.

Field plots will be established at Central Farm and/or in selected farms in advance of the course. The plots will serve as instructional aids for field identification of insects and diseases. It will be the responsibility of the MOA (with assistance from SAP) to have the field plots ready for training purposes.

CATIE will be responsible for conducting the training course and providing instructional materials. CATIE will provide a syllabus of the training courses well in advance (at least one month) for review by the Agriculture Coordinating Committee of the NARMAP project.

Participants in the initial course will come from the MOA (in the target area and outside), interested NGOs and progressive farmers. The initial course will cover the general concepts of IPM and critical agronomic practices that are components of IPM, regardless of crop. The number of participants will be around 25.

The second course will address management of insects and diseases. It will cover identification, biology of the insect/disease, means of field monitoring, and methods of control. Participants will include at least 4 MOA extension staff from Cayo, NARMAP field agronomists, technicians from NGOs and selected extension staff

from other districts. It is anticipated that the number of participants would be approximately 15.

The third course will focus only on IPM in the five vegetables crops important in Cayo. The course contents will concentrate on methods of delivering the IPM message contained in the brochures. The course will be field-oriented and concentrate on methods of technology transfer. The number of participants should be reduced to 10 due to the individual attention required for field evaluations.

C. In-service Training at CATIE

A component of the IPM program is institutional strengthening. Ideally, the Plant Protection Division (PPD) of the MOA should be the lead Belizean agency responsible for coordinating the IPM program. However, if the PPD continues with diverse functions such as quarantine regulations, etc., then the MOA should consider a separate unit for pest management. In this case the PPD would provide technical backstopping to the IPM program in entomology and pathology. The IPM program would comprise of IMP specialists and field agronomists.

The PPD is currently understaffed and positions are filled by contract staff and temporary assistance from external sources. The MOA is in the process of upgrading its technical staff via degree training at overseas universities. The MOA must provide permanent positions for the returning staff that will be assigned to the PPD or IPM program. If the PPD is the lead agency, it should consist of, as a minimum, a full-time plant pathologist, an entomologist, and an agronomist responsible for cultural practices. The three professionals will be supported by three technicians and adequate field labor. If a separate IPM program is necessary, then it should consist of an IPM specialist and agronomist with the PPD providing technical support.

The MOA has the opportunity for revitalizing its technical capabilities. An entomologist (Mr. Orlando Sosa) at the M.Sc. level will return at the end of 1994. Mr. Lizandro Quiroz also returns at the same time with an M.Sc. in plant pathology. Ms. Francine Magloire will return in August of 1995 with an M.Sc. in IPM. In addition, the NARMAP agronomist for Cayo District (Renzo Quiroz) will receive extensive training in IPM and should have a joint appointment with the MOA with NARMAP providing funds for his salary until September 1996. At the termination of the NARMAP project, the agronomist should have a full-time appointment with the MOA.

It is imperative that careful consideration be given to institutional strengthening. The return of four B.Sc. level staff, four M.Sc. candidates and the three NARMAP agronomists offers the unique opportunity to enhance the technical divisions of the MOA.

A carefully focused MOA with a corps of young technical staff can have measurable impacts for agricultural development in Belize. The IPM program is a priority area of the GOB and the collaborative program with CATIE should be viewed as a step toward focusing activities and staff on key constraints.

The PPD (or a similar division with only IPM responsibilities) will coordinate IPM efforts and be the contact agency with CATIE. The PPD will disseminate information and provide research back-stopping, when applicable, to the IPM technology transfer program. CATIE will further back-stop national efforts when required. The level of effort required from the PPD is only part-time, but the PPD will have responsibilities independent of the IPM program for vegetables, e.g., areas outside of Cayo and national direction for non-vegetable crops.

CATIE will provide in-service training to returning professional staff. The training will be in the form of in-service, in which the Belizean professionals will work on a daily basis with CATIE's professional staff. The length of training will be two months and will be conducted as soon as feasible upon the return of Belizean staff from overseas academic training.

Germplasm evaluation and characterization are not being conducted in Belize on any major crop. Farmers are conducting their own research on imported germplasm in the absence of better information. Seeds distributed by commercial firms are imported directly from the U.S. or other temperate countries. There is no information on the reaction of available germplasm to major insects or diseases. It is proposed that germplasm testing be conducted on a routine basis in collaboration with CATIE. It is recognized that CATIE does not have a varietal improvement program but the institution can be a facilitator for collecting germplasm from other international institutions, private companies, and national research programs. Germplasm will be tested in Belize by the PPD or other appropriate agencies, e.g., BFAC. However, a professional staff will require training in methods of germplasm evaluation. CATIE can provide the required training through its interdisciplinary team. A one-month in-service training program is proposed for this function.

D. Support to Technology Transfer

The previously described activities will set the stage for an active on-farm technology transfer program. Farmers will be armed with instructional material that will enable them to make appropriate decisions on pest management, extension staff will be trained in IPM methodology and the program will be organized through PPD. The final step is to put the knowledge in practice and this entails on-farm activities.

Model commercial plots will be established in collaboration with progressive farmers. In these plots a coherent assortment of integrated management practices for the most important pests will be put into practice and evaluated from various aspects, e.g., environmental and natural resource, biological and socio-economic.

It is expected that during the elaboration and implementation processes of the IPM program, insufficiencies and gaps in the existing pool of information will appear. The model plots will serve to identify these deficiencies and to prompt research efforts. The IPM model plots will generate research and their results, in turn, will feed back into the technology transfer activities. The model plots will be organized by PPD in close collaboration with the extension service. CATIE's role will be to technically back-stop this effort. This will require that professional staff from CATIE make timed visits to Belize to assist in this effort. It is estimated that five visits of one week each should be programmed for the first year, followed by three visits per year in subsequent years.

OBJECTIVES AND EXPECTED OUTPUTS OF THE IPM PROGRAM

The general objectives of the IPM program are to contribute to sustainable production of vegetable crops in the NARMAP target areas, improve natural resource utilization and reduce environment contamination. These are to be achieved by fostering a more accelerated process of change in the current pest control practices that are dependent upon chemical control to the use of integrated pest management alternatives.

More specifically, the project will provide farmers with alternatives and a means of decision making that reduces dependency upon chemical control of pests. The project will provide training to facilitate technology generation and transfer activities. The project will provide assistance to institutionalize pest management within the MOA thus providing an element of institutional sustainability.

The collaborative project is expected to yield the following major results:

1. an improved status of pest management in vegetable crops that maintains biodiversity, conserves natural resources and provides for protection of the environment;
2. a long-term biological and economically viable production system that does not endanger the health of farmers, field workers or consumers;
3. establishment of a national IPM program within the MOA that can extend the methodologies developed in this project to other geographic regions of Belize and/or to other crops; and

4. development of a long-term cooperative effort between Belize and CATIE that enables Belize to benefit from CATIE's information service, training opportunities, and technical expertise.

THE IPM PROGRAM STRUCTURE

Roles and Responsibilities:

Responsibility for the technical direction of the IPM activity will be with the Chief Agricultural Officer of the MOA. The program will be coordinated in Belize initially by the head of technical staff of the PPD, the PAO-Extension, the DAO-Cayo District, the NARMAP Cropping Systems Advisor and the USAID Project Manager who will be responsible for administrative coordination with CATIE through RENARM. CATIE's IMP program organized under the Sustainable Tropical Agriculture Division will be the lead agency in CATIE.

III. ACCELERATED MULTIPLICATION OF SELECTED ROOT AND TUBER CROPS

BACKGROUND INFORMATION

For decades farmers in many areas of Belize have cultivated a range of root and tuber crops for local markets and on-farm consumption. Prior to the citrus boom, many of these crops provided important sources of on-farm income. However, monoculture citrus production has pushed many of the traditional crops to secondary status. Currently, none of the root and tuber crops are grown on a commercial scale where production contributes significantly to farm incomes. Stann Creek valley is the only area where root and tuber crops still occupy an important role in traditional dishes and as a means of income. Cassava is the most important root and tuber crop followed by white yam. Other root and tubers crops with significant production are sweet potato, cocoyam, and negroyam.

Depressed citrus prices in recent years and the forecast for continued unfavorable prices has resulted in a renewed interest on the part of many farmers for cultivating new crops. Root and tuber crops are preferred as the crop is traditional and domestic prices are attractive. However, improved technologies for cultivating these crops is lacking. For example, there has not been genetic improvement in Belize in the traditional root and tuber crops for at least 40 years. Consequently, any effort to cultivate most root and tuber crops will commence at a very low base level. Prospects for competing on the world markets must recognize this deficit.

The SAP program in collaboration with the Livestock Division of the MOA recently conducted a feasibility study on the potential use of cassava as an animal feed. There is also a potential market for cassava for human consumption. The results of these feasibility

studies are encouraging and the SAP program is supporting the development of cassava as an alternative source of animal feed among other uses. The MOA has also recently made contacts with exporters who have expressed interest in indigenous crops for niche, ethnic markets in the U.S. However, there has not been feasibility studies on production costs, export prices, quality demands, etc. This will be required before any serious consideration can be directed to improving production of these crops.

The Government of Belize is presently emphasizing and actively encouraging farmers to diversify and intensify production of crops to reduce the food and nutrition imports and create opportunities for exports. In view of the importance of diversification for food security and income generation, the Ministry of Agriculture plans to focus on accelerated multiplication of improved planting material of cassava, yams, coco and dasheen to ensure the successful production of these crops.

Cassava and, no doubt, other root crops would also contribute to the diversification of citrus production and the intensification of production of favored lands which would contribute to the long-term sustainability of the citrus-based agricultural production system of Stann Creek.

The availability of good quality, disease-free planting material of improved varieties is considered critical for the successful production of these crops. The SAP component of the NARMAP Project is supporting a program of activities on cassava production and utilization. The program has collected local clones for initiating activities but the introduction, testing and dissemination of improved genetic material will be required. The SAP program requires facilities for handling introduced invitro material and to rapidly multiple promising clones. Also, most vegetatively propagated material becomes infected with diseases after several years of cultivation. Passing material through invitro regeneration cleans the material of most diseases and viruses. This process is essential for the long-term viability of the crop. Consequently, there is a need to have the required support for culturing and multiplying material. Other root and tuber crops should be handled in the same manner.

PROGRAM PURPOSE

The purpose of this program is to establish a root tuber and germplasm multiplication facility in Belize, with the cooperation of CATIE, for the production of the required material for cassava and other crops. Training of local staff at CATIE and in Belize will be required to support this process. The MOA will require technical support from CATIE until the program is well established.

PROGRAM OBJECTIVES

The objectives of the collaborative effort are as follows:

1. accelerate multiplication, distribution and adoption of improved genetic material of root and tuber crops;
2. develop technology and procedures to produce healthy planting material at competitive prices on a commercial scale;
3. provide technical and training support to researchers, extension staff and producers; and
4. develop a collaborative program between CATIE and MOA enabling the periodic re-generation of commercial varieties through invitro cultures to clean-up planting material.

PROGRAM OUTPUTS

The expected outputs of the collaborative effort are as follows.

1. The MOA will have a permanent multiplication site in the Stann Creek District. This facility will produce improved genetic material for use by GOB agencies and commercial crop producers.
2. Belizean staff will be capable of handling invitro material and providing clean genetic material to commercial producers of planting material.
3. National capacity will be established to develop multiplication and distribution of certified planting material.

ROLES AND RESPONSIBILITIES

The collaborative program consists of three agencies: the NARMAP project, the MOA and CATIE. The duration of the proposal is for three years but the SAP's commitment will terminate in September 1996. Buy-in support from CATIE will be arranged through the USAID/RENARM Project. The program will contain activities that will occur after SAP's termination but without USAID financial support, e.g., technical back-stopping from CATIE.

The MOA will provide an Agronomist/Manager qualified at the B.Sc. level to be assigned full-time to the day-to-day operation and management of the project. This assignment will be for a period of at least three years until such time as the private sector may be able to take over the function. The MOA agronomist will function as a nursery specialist stationed at the Stann Creek Agricultural Station. The MOA will also provide transportation for official use by the specialist.

The MOA will assign a designed area in the Agricultural Station at Stann Creek to serve as the site for the facilities for regenerating invitro material. The MOA will also provide land and land preparation services for the growing of seedlings (field nurseries). The MOA will provide all inputs required to maintain the nurseries, e.g. labor, fertilizers, pesticides, harvesting material, etc. The MOA will provide technical assistance to commercial seedling producers.

The MOA will make extension staff available in the target area for training and will be responsible for organizing local training.

The NARMAP project will provide in-country assistance to the MOA and financial resources to CATIE to initiate the proposal. In collaboration with the MOA, NARMAP will make available limited funds for up-grading facilities at the Stann Creek Agricultural Station for regenerating invitro material. NARMAP will also provide assistance in developing field nurseries, e.g. irrigation, etc.

NARMAP will assist the MOA in the conduct of training courses in Belize through the provision of printed material, venue costs, etc.

NARMAP will make available to CATIE through the buy-in mechanism, funds for traveling to Belize and per diem for technical staff. This will consist of a preliminary visit for one week to advise on infrastructural needs at the Agricultural Station. NARMAP will cover the expenses for CATIE associated with the provision of a training course in Belize.

NARMAP will also provide financial support to CATIE for technical back-stopping of the proposal. This will consist of 3 visits/year for a duration of one-week/visit. NARMAP will provide CATIE with funds to produce invitro material to be sent back to Belize. This assistance will be provided for the duration of the proposal.

CATIE will provide a technician to advise on up-grading facilities at the Stann Creek Agricultural Station. CATIE will conduct a training course in Belize on root and tuber production and will provide printed material for the training. CATIE will provide in-service training to the Belizean nursery specialist in Costa Rica.

CATIE will provide technical back-stopping to the project for the three years and make available technical staff for three visits/year to Belize for a duration of one week per visit.

CATIE will provide genetic material of specified root and tuber crops in the form of invitro cultures. CATIE will also pass commercial material through invitro cultures and return the material to Belize.

IV. AGRO-FORESTRY PROGRAM

BACKGROUND INFORMATION

One of the major activities of the SAP program is the promotion of more intensive production on lands suitable for agriculture. This in turn should decrease the use of steep hillsides and other marginal lands. These lands can be reforested or cultivated using modern technologies of agro-forestry. However, the potential for agro-forestry or tree farming has not been adequately studied in Belize to develop a course of action.

Personnel from the Ministry of Agriculture, the Forest Department of the MNR and NARMAP have agreed that the development and implementation of a program should be pursued only after a careful analysis of the potential for agro-forestry within Belize. It was agreed to request the assistance of Winrock International (WI) and CATIE to provide technical advice on the feasibility of agro-forestry in Belize.

PROGRAM OBJECTIVE

The objective of an initial CATIE agro-forestry consultation is to provide the GOB and NARMAP with technical advice on the potential for agro-forestry as a viable land use practice in various areas of Belize.

TASKS

CATIE will supply two specialists in agro-forestry to perform the following tasks:

1. review current farming practices and advise on the potential for agro-forestry within different ecological zones (the consultants will provide recommendation on promising agro-forestry practices that are compatible with current land use practices in Belize);
2. evaluate the potential of agro-forestry in improving sustainable natural resource management; and
3. make specific recommendations on the incorporation of agro-forestry techniques into the agriculture and forest production programs in Belize, especially in the boundary of protected areas within the NARMAP target sites.

REPORTS AND DELIVERABLES

1. A draft report will be produced by the consultants and presented at a briefing to the NARMAP project committees and other interested parties before departure from Belize. The report will be reviewed by the Agricultural and Forestry

Coordinating Committees of the NARMAP Project. Corrections will be submitted to the Cropping Systems Advisor within two weeks of the review for transmission to the consultants. The final report will be presented by the consultants within two weeks after receipt of the corrections or amendments.

LEVEL OF EFFORT

It is anticipated that the two consultants will require thirteen (13) working days each to complete this task. The period of the visit to Belize will be limited to ten working days per consultant. Three days will be allocated for report preparation and finalization at CATIE.

ROLES AND RESPONSIBILITIES

The visits will be coordinated by the NARMAP Cropping Systems Advisor in consultation with the Chief Agricultural Officer and the Chief Forest Officer. The consultants will report jointly to the Chief Agricultural Officer of the MOA and the Chief Forest Officer of the MNR. The USAID Project Manager will be responsible for the administrative coordination of this activity with CATIE through the RENARM Project as a component of the buy-in being arranged with CATIE.

**RENARM-CATIE BUY-IN
 ILLUSTRATIVE BUDGET (US \$)**

LINE ITEM	USAID	GOB	CATIE	TOTAL
PERSONNEL COST				
Salaries IPM	12,600.00 *	500.00	5,000.00	18,100.00
Salaries ROOT TUBER	0.00	0.00	11,000.00	11,000.00
Salaries AGRO FORESTRY	7,800.00 *	0.00	0.00	7,800.00
TRAVEL AND PER DIEM				
Per Diem IPM 60 days @ \$120/day	7,200.00 *	0.00	0.00	7,200.00
Per Diem ROOT TUBER 51 days @ \$120/day	6,120.00 *	0.00	0.00	6,120.00
Per Diem AGRO FORESTRY 20 days @ \$120/day	2,400.00 *	0.00	0.00	2,400.00
Air Fares CATIE Belize return x 19 @ \$350	6,650.00 *	0.00	0.00	6,650.00
GERMPLASM COLLECTION	5,000.00	4,000.00	6,000.00	15,000.00
INFRASTRUCTURE	0.00	6,000.00	0.00	6,000.00
NURSERY MAINTENANCE	0.00	3,500.00	0.00	3,500.00
TRAINING COSTS BELIZE	1,500.00	2,500.00	1,500.00	5,500.00
TRAINING COSTS CATIE	1,500.00	0.00	1,500.00	3,000.00
TECHNICAL SUPPORT (IPM)	9,350.00 *	2,750.00	16,500.00	28,600.00
ON-FARM TRIALS	5,000.00	5,000.00	0.00	10,000.00
EXTENSION BULLETIN (IPM)	3,500.00 *	3,500.00	5,000.00	12,000.00
TOTAL	68,620.00	27,750.00	46,500.00	142,870.00

* USAID/CATIE BUY-IN: \$55,620

**RENARM-CATIE BUY-IN
 PRESUPUESTO ILUSTRATIVO (US \$)**

RUBRO	USAID	GOB	CATIE	TOTAL
COSTOS DE PERSONAL				
Salarios MIP	12,600.00 *	500.00	5,000.00	18,100.00
Salarios ROOT TUBER	0.00	0.00	11,000.00	11,000.00
Salarios AGRO FORESTERIA	7,800.00 *	0.00	0.00	7,800.00
VIAJE Y VIATICOS				
Viáticos MIP 60 días @ \$120/día	7,200.00 *	0.00	0.00	7,200.00
Viáticos ROOT TUBER 51 días @ \$120/día	6,120.00 *	0.00	0.00	6,120.00
Viáticos AGRO FORESTERIA 20 días @ \$120/día	2,400.00 *	0.00	0.00	2,400.00
Pasajes CATIE Belize retorno x 19 @ \$350	6,650.00 *	0.00	0.00	6,650.00
COLECCION DE GERMPLASM	5,000.00	4,000.00	6,000.00	15,000.00
INFRAESTRUCTURA	0.00	6,000.00	0.00	6,000.00
MANTENIMIENTO DE VIVERO	0.00	3,500.00	0.00	3,500.00
COSTOS DE ENTRENAMIENTO BELIZE	1,500.00	2,500.00	1,500.00	5,500.00
COSTOS DE ENTRENAMIENTO CATIE	1,500.00	0.00	1,500.00	3,000.00
APOYO TECNICO (MIP)	9,350.00 *	2,750.00	16,500.00	28,600.00
ENSAYOS EN GRANJAS	5,000.00	5,000.00	0.00	10,000.00
BOLETIN EXTENSION (MIP)	3,500.00 *	3,500.00	5,000.00	12,000.00
TOTAL	68,620.00	27,750.00	46,500.00	142,870.00

* USAID/CATIE BUY-IN: \$55,620.