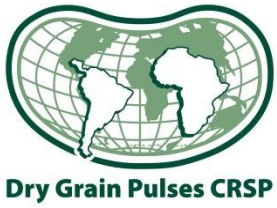

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BEAN TECHNOLOGY DISSEMINATION

Strategic Investment in Rapid Technology Dissemination: Commercialization of Disease Resistant Bean Varieties in Guatemala, Nicaragua, Honduras and Haiti.

(Associate Award to the Dry Grain Pulses CRSP)

October 1, 2010 – September 28, 2013

ANNUAL TECHNICAL PROGRESS REPORT
FY 2012

October 1, 2011 – September 28, 2012

Two of the more than 4,000 beneficiaries who received 10 pounds of ICTA Hunapú this year. Farmers in the Guatemalan western highlands plant only one crop of bush beans per year.

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List Of Acronyms

Acronym	Meaning
CSB	Community Seed Banks
BTD	Rapid Bean Technology Dissemination Project
CIAT	Centro de Investigación Agrícola Tropical, Cali, Colombia
CRSP	Collaborative Research Support Program
Cwt.	Hundred-weight (sacs of 100 pounds.)
DICTA	Dirección de Ciencia y Tecnología Agropecuaria-Honduras
DR	Dominican Republic
EAP	Escuela Agrícola Panamericana-Zamorano, Honduras
FIPAH	Fundación para la Investigación Participativa con Agricultores en Honduras
FTF	Feed The Future
FUNDIT	Fundación para la Innovación Tecnológica, Agropecuaria y Forestal
FY	Fiscal Year
ICTA	Instituto de Ciencia y Tecnología Agrícolas, Guatemala
IDC	Indirect Cost – rate
IICA	Inter-American Institute for Cooperation on Agriculture
INTA	Instituto Nicaragüense de Tecnología Agropecuaria, Nicaragua
MO	Dry Grain Pulses CRSP Management Office – MSU
MSU	Michigan State University
MT	Metric Tons
NGO	Non-Governmental Organization
NSS	National Seed Service – Haiti
PRR	Program for Rural Reconstruction, Honduras
PDT	Plot planted with 20 pounds of seed used for technology dissemination, Nicaragua
SNEA	Sistema Nacional de Extensión Agrícola– Guatemala
SOW	Scope(s) of Work
UNISEM	Unidad de Semilla – INTA, Nicaragua
UPR	University of Puerto Rico
USAID	United States Agency for International Development

A proud farmer near Yojoa Lake, Honduras, shows off his harvest of Amadeus 77. Farmers in this area have produced yields greater than 28cwt./hectare with this and other varieties developed by the Dry Grain Pulses CRSP.

INTRODUCTION

This is the second annual report of the Bean Technology Dissemination (BTD) project (*Strategic Investment in Rapid Technology Dissemination: Commercialization of Disease-Resistant Bean Varieties in Guatemala, Nicaragua, Honduras and Haiti*). Our work during Fiscal Year 2012 continued to address the shortage of high quality bean seed of improved varieties available to resource-poor farmers. Unlike the first year, it is satisfying to report that all country programs in Haiti, Guatemala, Honduras and Nicaragua have worked consistently toward the three-year project goals. We continue to be fully aligned with the goals of the U.S. Government's Feed the Future (FTF) Initiative and have expressed this commitment to USAID country missions during several visits throughout the year. Positive feedback from USAID country missions has confirmed that increased agriculture productivity, profitability and income at the rural family level remains a top priority of the

FTF program. By disseminating improved bean varieties in small amounts for the second year in a row, the multiplicative factor of spreading seed security during several production seasons provides evidence of success and important lessons learned. Details on the activities performed and the results achieved during this year are described in this report, with particular detail on the determinants of high productivity witnessed in several regions of the four target countries. The report also places especial emphasis on the plans for the third and final year of this initiative, where we hope the approach will result in important spin-offs and other donor programs that NARs can take advantage of.

Despite the progress achieved during Year 2, different challenges in project management were also encountered. Some positive highlights include improved coordination and the attainment of milestones toward the three-year project goals in the Haiti program. Equally positive is that partners in Honduras continued to work firmly on a set of goals and achieved this year's objectives in most regions. One exception is the Atlantic coast, where the third production season (*apante*) began in October and November and for which it is too early to report any results. On the less positive side, institutional changes that affected our partners in Guatemala, particularly the National Extension Service (SNEA), affected the plans presented in the *Year 1 Annual Report*. The arrival of a new president, a new minister of agriculture and new SNEA authorities led to changes in personnel at all levels. As a result, many of the trained extension agents in Year 1 were laid off. With no boots on the ground to perform the seed dissemination and monitoring activities, FUNDIT had to rely on a network of collaborating NGOs in the target geographic areas. Despite these challenges, the end result for this year in Guatemala has been positive and the future looks promising now that SNEA is in full operation under the current presidential and ministerial administration.

The situation in Nicaragua this year posed important climatic challenges. Community Seed Banks (CSB) in all five regions were successfully established again, but an extended drought affected the production of CSBs and did not lead to a strong *postrera*[1] planting season. The distortions caused by the drought this year have also delayed the *apante* season, pushing the agricultural year more than a month beyond its usual planting dates. The situation was not particular to Nicaragua; some areas in North Atlantic Honduras experienced the same challenges. Because these changes consequently affected Year 3's agriculture year, this report outlines the need for a six-month, no-cost extension for Year 3 that would permit the project to follow the *apante* season from October 2013 through March 2014. Without this extension, it will be difficult to stay close to these two countries' programs to verify deliverables and to gather the project's monitoring and evaluation data. Several tables are presented at the end of this report that summarize the effect of these climatic events.

The BTD project has continued to place the highest priority on implementing activities that contribute to the establishment of sustainable bean multiplication and dissemination

[1] There are three cropping seasons in Central America: (i) *Primera*, or first, which takes place at the onset of the rainy season; (ii) Segunda, also called *postrera*, is the second season, planted in the middle of the rainy season; (iii) *Apante*, or third, is the last cropping season of the agricultural year, planted in the last weeks of the year to take advantage of residual soil humidity and the occasional precipitations during the dry seasons typical of Peten in Guatemala, the Atlantic North of Honduras, and the Pacific South and North of Nicaragua.

systems in each country. This sustainability goal has been given nearly equal priority as the dissemination targets (number of beneficiary farmers) by the partnering NARs. The consensus of the bean sector, based on years of experience in both developed and developing countries, is that community concern for and commitment to ensuring seed security as well as farmer ownership of the production of high quality seed (of large-seeded, self-pollinated staple grains such as beans) to meet local planting needs are critical sustainability factors that should be considered in the design of any bean technology dissemination project.

Together, these partnerships helped bring us closer to our three-year goals for the four countries as shown in Table 1. The following table provides a snapshot of our most salient achievements over the past two years. Note, however, that the results for Year 2 do not yet include harvesting for the *apante* season in Honduras and Nicaragua.

Table 1. Cumulative results of the BTD project

Achievement	**Year 1 Results**
Smallholders accessed with quality seed of improved varieties	23,221
Hectares cultivated with the improved bean varieties multiplied and disseminated by BTD partners	5238
Number of producers' organizations partnering with the BTD project	55
Community Seed Banks (CSB) established (total for Guatemala, Nicaragua and Honduras)	207
Number of improved seed varieties disseminated that were developed with support of the Bean/Cowpea and Dry Grain Pulses CRSPs.	11

Important advances have been documented towards building seed security in the region. Through the multiplication and effective storage of seed, farmers in a community are assured of access to affordable quality seed to plant their next crop, even if they have experienced a crop failure for any reason. As resource-poor, smallholder farmers clearly understand, seed security directly translates to both household food security and opportunities to generate needed income.

The experience in Nicaragua during the first year of the BTD project's implementation has been highly positive and has motivated the Pulse CRSP Management Office to promote the Community Seed Bank model in other Central American countries where common bean is extensively grown and consumed. To date, more than 235 CSBs have been established,

benefiting more than 12,000 farmers. Key aspects of the CSB model that are conducive to sustainability include:

- Building upon existing social networks and capital within a community
- Establishment of long-term seed and grain reserves of critical staple crops to reduce vulnerability and increase the resilience of smallholder farmers to episodic environmental and economic shocks
- Farmer access to and understanding of the potential of improved technologies (including quality seed for planting, "registered" seed of improved varieties, fertilizers, postharvest grain storage silos, etc.) and management practices to enhance bean yields
- Provision of training and technical assistance by the NARS through a network of progressive farmers in a region (*Promotores*) that provides leadership to Community Seed Banks and serves as a catalyst for transformative change in farming systems.

Another area of success achieved by the project is in linking sources of foundation seed produced with the support of the BTD project at EAP–Zamorano with NARS in Honduras, Nicaragua, Guatemala and Haiti. The availability of this seed has been limited in previous years due to the lack of a coordinated effort and the financial support to cover seed production, conditioning (drying, cleaning and classification) and shipping costs. The importance of foundation seed is the capacity to begin with strong genetic material to produce registered seed that is then multiplied into certified or quality-declared seed. In 2012 this action supported the production of registered and qualified seed for multiple seasons. A total of 6.84 metric tons of foundation seed for small red varieties and 1.6 metric tons of foundation seed for small black bean varieties were distributed to collaborators in the four countries for multiplication.

In Honduras, the collaborators included national and international NGOs as well as three separate producer groups and seven individual groups coordinated with the national agriculture research institute DICTA, making it possible to reach more than 12,000 farmers. In Guatemala, the national agriculture research institution (ICTA) multiplied this seed into fifteen metric tons of seed that contributed to reaching more than 2,000 farmers in the Guatemalan highlands and low valleys. In Nicaragua, the provision of foundation seed has replenished seed stocks of major varieties by .09 MT, leading to more than fifteen metric tons of registered seed used for distribution to community seed banks. In addition to these amounts, small quantities of genetic seed of improved varieties were sent to collaborators in Nicaragua and Haiti for the reproduction of foundation seed by INTA and the National Seed System (NSS) in these countries

Other than this introduction, this report is organized in three parts. First, an account of more detailed country highlights offers a breakdown of beneficiaries. Each country summary is rich in tables and quantitative references outlining the results for this year. A special session on the promotion of *Rhizobium* inoculum activities led by the University of Puerto Rico (UPR) is included, followed by a brief section on major lessons learned. With two years into the program, this report now includes short success stories derived from BTD efforts and the dedication of our partners. The final section includes key project management and financial highlights in preparation for the third and final year of the project. An annex with the contract amendments and budgets for Year 3 is included.

A proud farmer in Guatemala receives the ICTA team with a freshly cooked bean stew prepared with the Hunapú variety disseminated this year.

GUATEMALA

The BTD experience in Guatemala in Year 1 showed that a combination of ICTA and SNEA in most of the target regions was a winning formula. Neither institution received direct funding but rather the facilitation of inputs through FUNDIT, which has been a needed arrangement in this fast-paced initiative. In the field, ICTA provided the training backed by technicians with decades of accumulated experience in bean production, while SNEA provided extension agents, sometimes two per municipality, to cover the target geographic areas. Building on these dynamics, the contract with FUNDIT in Year 2 assumed that a similar engagement would have worked in the Guatemala western highlands, a region characterized by multiethnic and multilingual societies. As the contract was drafted, SNEA provided a description of their network of extension agents in this area. Most agents came from the same communities where they worked and were culture and

language savvy in this environment. The contract was signed and plans to multiply seed were carried out successfully during the early part of 2012.

These were safe assumptions based on the good results obtained in Year 1. However, the presidential elections resulted in a new administration that introduced changes at all levels in the Ministry of Agriculture. By the time the project started, political changes at the Ministry of Agriculture made it impossible for SNEA to be engaged in the BTD seed dissemination plans. By March 2012, services contracts for extension agents were not renewed and it was rumored that new people would be hired. It was expected that the same agents would be immediately rehired, but that only happened for less than 5% of the already trained force. New personnel, who needed to be trained by ICTA, were not hired until later in August and September—already late for the seed dissemination activities.

In light of this situation, ICTA managed to engage a network of NGOs and farmer organizations in the target geographic areas, both in the Guatemalan highlands and northern region of Petén. Efforts to visit CSBs organized during Year 1 in the southeastern region were insufficient to follow up on all of their activities. Important lessons were learned in the BTD project pursuit to engaging NARs in a continually increasing manner.

Seed production

From December 2011 to April 2012 seed production took place in the department of Baja Verapaz, in the municipality of San Jeronimo. The producer contacted agreed to multiply the seed varieties HUNAPU and ICTA LIGERO following the ICTA recommended seed production protocol. The production period coincides with the dry season to ensure the least incidence of seed-transmissible diseases. ICTA made several visits to the field to ensure compliance with the phytosanitary program. The BTD project manager visited the field at the time of harvest to ensure proper handling and transportation of the seed to ICTA warehouses for final conditioning. Table 2, below, shows the amounts and varieties produced for this dissemination campaign. The excellent experience of working this year has motivated the project to work with the same producer for the seed multiplication efforts of Year 3.

Supervision of production fields of ICTA Hunapu and ICTA Ligero, Baja Verapaz, Guatemala

Training activities

This year training activities started with 24 extension agents of the ZERO HUNGER program in Huehuetenango and two sessions with organizations from the departments of Sololá, Totonicapán, Huehuetenango, Quiché and San Marcos. Training sessions begin with a review of the BTD project objectives, target beneficiaries and the goals of the Feed the Future program. A review of food security statistics in Guatemala was conducted before beginning the agronomic aspects of bean production. In terms of production, the themes start with the practices of artisanal seed production and the importance of strengthening community-based organizations in the use and sustainable production of improved bean varieties.

Table 2. BTD Project seed processed at ICTA facilities during Year 2.

Seed variety	Category	Processed seed (cwt.)	Seed for dissem. (cwt.)	# of bags	Bag weight (lbs.)	Stock at ICTA
ICTA Ligero	Certified	200	200	1000	20	20
ICTA Ligero	Genetic	2	0	0	0	2.0
ICTA ** Peten	Certified	165	165	900	20	165
ICTA Peten	Genetic	5	0	0	0	5
ICTA HUNAPU	Certified	400	400	4000	10	
ICTA HUNAPU	Registered					35
		28 TM	TOTAL	5,900		

** Reserved seed is kept at ICTA to be used next year.

Training session with technicians from the state-run ZERO HUNGER program

Promoting application of *Rhizobium* inoculum

During the training session, examples on the use of *Rhizobium* inoculum were shown. ICTA has been trained at EAP–Zamorano by Drs. Consuelo Estevez de Jensen and Juan Carlos Rosas. In 2012 two ICTA representatives participated who brought three strains of *Rhizobium* to Guatemala for multiplication purposes. The strains are *R. tropici* CIAT 899, *R. tropici* CR 477 and *R. etli* CIAT 632. At least 165 individual applications were prepared

and provided to NGO technicians. The plots with *Rhizobium* inoculum will be compared with noninoculated plots and shown to farmers on open field days.

Training session in Huehuetenango, Guatemala

Seed dissemination activities

Three varieties were disseminated: (i) ICTA Hunapu for the highlands above 1000 meters, (ii) ICTA Peten for the northern department of Peten, and (iii) ICTA Ligero for the low valleys of the western highlands. The agreement with partner organizations consisted of disseminating 10 pounds per farmer in the highlands (to cover approximately 1000 square meters or 1/6 of a *manzana*, or 1/10 of hectare), justified on smaller land holding

Farmers in Huehuetenango receive BTD seed from ZERO HUNGER and ICTA technicians.

characteristics. The same amount was disseminated in the valleys below 1000 meters in the departments of Huehuetenango and Quiche where, due to altitude and agroclimatic conditions, ICTA Ligero is the recommended variety. Only in the northern region of Peten did our partners continued to disseminate 20 pounds per farmer of the variety ICTA Peten.

Several meetings were held with the organizations involved in bringing about the dissemination plans in the target areas. The umbrella organizations were CEIBA and REDSAG, which provided the needed support to identify farmers and gather the monitoring data. Agreements were drafted and signed with these organizations in order to agree on the communication channels with their field representatives. These agreements increased transparency and accountability regarding the partners' commitment to data collection and reporting.

Special collaboration was sought with two government agencies, the ZERO HUNGER program and the Secretariat of Food Security (SOSEP). ICTA held training sessions in several locations where ZERO HUNGER technicians were invited. The technicians were impressed by the quality of the training sessions and helped with the dissemination and monitoring of the farmer plots.

Seed delivery in Nebaj, Quiche, and in Huehuetenango by NGO promoters

Table 3. Seed dissemination to targeted communities in Guatemala

Department	Municipality	Partner Institution	Variety Dissemianted	Beneficiaries
	San Miguel Acatán	MAGA	ICTA Hunapu	516
	San Mateo	MAGA	ICTA Hunapu	389
Huehuetenango	San Juan Atitán	MAGA	ICTA Hunapu	120
	Santiago Chimaltenango	MAGA	ICTA Hunapu	266
	Santa Bárbara	MAGA	ICTA Hunapu	16
Quiche	Nebaj	MAGA	ICTA Hunapu	388
Quiche	Chajul	MAGA	ICTA Hunapu	30
	Santa Maria Chiquimula	CODISMA	ICTA Hunapu	10
Totonicapan	Santa Lucia la Reforma	CODISMA	ICTA Hunapu	80
	Totonicapan	SOSEP	ICTA Hunapu	218
	Solola	SOSEP	ICTA Hunapu	27
Solola	Santa Catarina Ixtahuacan	Organización	ICTA Ligero	159
	Nahuala	Organización	ICTA Ligero	45
	Quetzaltenango	SOSEP	ICTA Hunapu	150
	Genova Costa Cuca		ICTA Ligero	150
	Palmar		ICTA Ligero	100
	Cuatepeque		ICTA Ligero	150
	Cantel		ICTA Hunapu	12
	Olintepeque		ICTA Hunapu	24
Quetzaltenango	Zunil		ICTA Hunapu	13
	Salcaja		ICTA Hunapu	29
	Palestina		ICTA Hunapu	25
	San Miguel Siguila		ICTA Hunapu	8
	Caprin		ICTA Hunapu	13
	Huitan		ICTA Hunapu	9
	Flores Costa Cuca		ICTA Ligero	100
	San Marcos	SOSEP	ICTA Hunapu	681
	Tajumulco	SOSEP	ICTA Hunapu	51
	Sibinal	SOSEP	ICTA Hunapu	80
	Tacanei	SOSEP	ICTA Hunapu	80
	San Jose Ojetan	SOSEP	ICTA Hunapu	43
San Marcos	Concepcion Tutuapa	SOSEP	ICTA Hunapu	138
	Ixchiguan	SOSEP	ICTA Hunapu	29
	Sibinal 2	SOSEP	ICTA Hunapu	32
	Tajumulco 2	SOSEP	ICTA Hunapu	38
	Comitillo	SOSEP	ICTA Hunapu	162
	Chimatenango	FONTIERRAS	ICTA Hunapu	139
Chimatenango	Patzun	FONTIERRAS	ICTA Hunapu	28
	yepocapa	FONTIERRAS	ICTA llgero	145
	Guanagazapa	FONTIERRAS	ICTA llgero	76
Escuintla	Escuintla	FONTIERRAS	ICTA llgero	24
	Santa Lucía Cotzumalguapa	FONTIERRAS	ICTA llgero	20
	Cuilapa	FONTIERRAS	ICTA llgero	90
Santa Rosa	Oratorio	FONTIERRAS	ICTA llgero	151
	Cuilapa	FONTIERRAS	ICTA llgero	90
Jutiapa	Moyuta	FONTIERRAS	ICTA llgero	70
Jalapa	San Pedro Pinula	FONTIERRAS	ICTA llgero	10
Izabal	Livinston	FONTIERRAS	ICTA llgero	39
Retalulheu	Champerico	FONTIERRAS	ICTA llgero	608
Peten	la Libertad	MAGA	ICTA Peten	300
Peten	San Luis	MAGA	ICTA Peten	200
Peten	Sayaxche	MAGA	ICTA Peten	300
Coban	Pending detailed report	FONDOTIERRAS	ICTA Peten	180
	Other pending detailed report			800
Total				**7651**

Women from CIALs, Honduras, condition seeds of different varieties in preparation for dissemination to farmers.

HONDURAS

At a regional level, EAP–Zamorano has collaborated with the BTD project, coordinating the production and dissemination of foundation seed. Other areas of regional collaboration include advanced technical assistance in *Rhizobium* production and training to the national research institutions (NARs) from Honduras (DICTA), Guatemala (ICTA), Nicaragua (INTA) and Haiti (NSS). EAP–Zamorano completed several trips this year that included joint visits with UPR in Haiti and a field visit to Guatemala to assess *Rhizobium* inoculant production techniques implemented by ICTA.

At a national level, EAP–Zamorano continued to work with two leading grassroots organizations: Program for Rural Reconstruction (PRR) and the Foundation for

Participatory Research with Farmers of Honduras (FIPAH) to benefit thousands of smallholder bean producers with access to improved bean varieties. In Honduras, field visits to evaluate the needs for technical assistance and training to support seed production and distribution activities under DICTA were also carried out. DICTA is the second major partner of the BTD project, which has established strong collaboration agreements with ACCESO/USAID, PILARH, UNIOSEN, ADEVAS and other organizations that assist in seed and inoculum dissemination.

EAP–Zamorano managed financial resources to support the seed multiplication and dissemination efforts by PRR and FIPAH and also partnered with other organizations with a long tradition of collaboration with small farmers, such as CRS and CARE. Several monitoring field trips included visits to seed production plots, seed conditioning facilities at CIALs and collaborating institutions. During these visits, recommendations were given to collaborators and farmers in regard to seed production practices, seed conditioning and storage, *Rhizobium* technology and inoculant use, and other aspects related to the project activities. Some of these visits were specifically planned with collaborators to provide technical assistance and training in the field.

Genetic and foundation seed dissemination results

More than one metric ton (MT) of genetic seed stocks of small red and small black improved bean varieties developed under the Bean/Cowpea CRSP and Dry Grain Pulses CRSP were regenerated. These genetic stocks were used to reproduce foundation seed of the diverse bean improved varieties demanded by beneficiary farmers and collaborators in Central America and Haiti.

To meet the project demand at a regional level, more than eight MT of foundation seed were produced at EAP–Zamorano during the *postrera* (Oct–Dec, 2011), the irrigated (Jan–Apr, 2012) and *primera* (May–Aug, 2012) seasons of FY12. The foundation seed produced by EAP–Zamorano during these seasons was distributed to institutions and organizations participating in the BTD Project in Honduras, Guatemala, Nicaragua and Haiti (see Table 4). Part of this foundation seed was used for farmer seed producers to multiply into qualified seed during the summer and *primera* plantings of 2012 with the assistance of technical personnel from partner organizations in Honduras.

Partner organizations participating in the project activities coordinated by Zamorano in Honduras during FY12 included the Program for Rural Reconstruction (PRR) at the Yojoa Lake (municipalities of the departments of Comayagua and Santa Bárbara); the Foundation for Participatory Research with Farmers of Honduras (FIPAH) in the municipalities of Yorito, Sulaco and Victoria (Yoro department), and in the municipality of Vallecillo (department of Francisco Morazán); Catholic Relief Services (CRS) and World Vision (WV) in the municipalities from the western region (departments of Lempira, La Paz and Intibuca); and CARE/CIAT in municipalities from the southern region (Morazán and Choluteca).

Dr. Luis Flores counts pods in a hilly field that yielded more than 30 cwt./manzana in Honduras.

Qualified seed

More than eight metric tons of qualified seed were produced of nearly 90 ha planted in farmer fields of seed producers, members of the Local Research Committee (CIAL), at the Yojoa Lake (Comayagua y Santa Barbara), Yorito- Sulaco-Victoria (Yoro), Vallecillo (Francisco Morazán), western region (Lempira, Intibucá and La Paz), and southern region (El Paraíso and Choluteca), in collaboration with technical personnel from PRR, FIPAH, WV, CRS and CARE during the 2012 *postrera*, irrigated and *primera* seasons, using foundation seed provided by Zamorano. This qualified seed was distributed in May and September 2012 to small farmer beneficiaries from these regions, for the *primera* and *postrera* planting seasons, respectively.

Seed distribution in the project countries

Foundation seed was provided to collaborating institutions in Honduras, Nicaragua, Guatemala and Haiti to support production of registered and qualified seed during the 2012 seasons (Table 4). Besides DICTA, the collaborators in Honduras receiving seed included PRR, FIPAH, WV, CRS and CARE as well as CIALs and other farmer organizations.

The foundation seed distributed in Honduras was used to plant nearly 90 ha to produce qualified seed in collaboration with farmers from CIALs of the Yojoa Lake region. This activity was done under supervision of technical personnel from PRR while CIALs from the Yorito–Vallecillo region were supervised by technicians from FIPAH. CIALs and farmer organizations worked in the western departments in collaboration with CRS and WV while CIALs from the southern region worked in collaboration with CARE/CIAT and in Zamorano during the irrigated and *primera* seasons.

Table 4. Foundation seed of small red and black bean improved varieties distributed to collaborators from the participating countries during FY12

Country (collaborator)	Small red varieties		Small black varieties	
	Quantity (MT)	No. Varieties	Quantity (MT)	No. Varieties
Honduras:				
DICTA	1.14	5		
PRR/ASOCIALAYO	1.73	16	0.04	1
FIPAH/ASOCIALs	1.91	13		
CRS, WV, CARE	0.69	7		
Nicaragua (INTA)	1.37	6	0.09	1
Guatemala (ICTA)			1.25	6
Haiti (NSS, Others)			0.23	1
Total (MT)	6.84		1.61	

In addition, small quantities of genetic seed of improved varieties were sent to collaborators of Nicaragua and Haiti for reproduction of foundation seed by INTA and the National Seed System (NSS), respectively.

Qualified seed to farmer beneficiaries

Qualified seed produced during the 2012 irrigated (January–April) and *primera* (May–September) seasons was distributed in seed packages of 20 pounds to more than 6,300 beneficiaries from the target regions and used by them for commercial production during the *primera* planting (May) and *postrera* (September–October) 2012 planting seasons in the Yojoa Lake, Yoro, F. Morazán, Western and Southern regions (Table 5). This qualified seed was used by small farmers for commercial production during the *primera* (May) planting and is currently being used for their *postrera* (September–October) planting.

Table 5. Beneficiaries of qualified seed during *primera* and *postrera* in Honduras

Collaborators	Beneficiaries	Region (departments)
PRR	2100	Yojoa Lake (Comayagua and S. Bárbara)
FIPAH	2100	Yorito, Sulaco and Victoria (Yoro) and Vallecillo (F. Morazan)
World Vision	500	Western (Intibucá)
CRS	800	Western (La Paz, Lempira and Intibuca)
CARE/CIAT	250	Southern (El Paraíso, Choluteca)
Zamorano	580	Eastern (El Paraíso, F. Morazán)
Total	6,330*	

* Includes qualified seed produced in FY12 and distributed in September–October 2012.

The BTD three-year workplan for Honduras considers the distribution of qualified seed to 10,000 farmers per year, under the responsibilities of EAP–Zamorano (6,000 beneficiaries) and DICTA (4,000 beneficiaries). Due to delays on the signing of the agreements among the participating institutions and the MO of the DGP CRSP/MSU, in Year 1 it was not feasible to start the majority of the activities for producing qualified seed in collaboration with farmers until the *primera* season. As a result, EAP–Zamorano only distributed qualified seed to 4,400 beneficiaries. In Year 2, more than 6,300 beneficiaries are being

reached. Data analysis by location and gender is being done for Honduras and other countries as the data from all partners is being collected in the field.

In Year 3, a target of 7,300 beneficiaries is required to be reached with qualified seed of improved bean varieties in order to reach the total of 18,000 beneficiaries under EAP–Zamorano´s responsibility for the three -year project. Part of this target will be accomplished by producing qualified seed during the *postrera* season (Sep–Dec 2011) and distributing this seed by mid-December 2011 (first quarter of Year 3) to reach at least 1,000 small farmers that traditionally produce beans during the *apante*. *Apante* planting season is traditional in regions with more favorable rainfall patterns, such as the Yojoa Lake and North Coastal regions. Currently, more than 20 ha of qualified seed have already been planted or are about to be planted in the Yojoa Lake, Yorito–Vallecillo and in EAP–Zamorano. The rest of the qualified seed for Year 3 will be produced during the irrigated and *primera* seasons of 2013. Additional collaborators, including CIALs from ASOCIADRO (La Paz and Intibuca departments) assisted by FIPAH will be involved in producing and distributing qualified seed to at least 800 farmers. Also, 1–2 medium size farmers with irrigation systems near EAP–Zamorano will be participating to produce sufficient qualified seed over the dry season (Jan–April) to reach more than 1,000 farmers from regions not assisted by PRR, FIPAH and other collaborators. Contacts have been already made with new partners.

Dissemination of *Rhizobium* technology

Demonstration plots including *Rhizobium* inoculation using a mixture of three strains are being used as comparison plots against noninoculated plots in the Yojoa Lake and the Yorito–Sulaco–Victoria regions that are managed using farmer production practices.

Ana Vargas, from EAP–Zamorano, teaches a group of farmers in Honduras the technique to apply *Rhizobium* inoculum.

Field days were conducted in these plots at flowering stage to show the differences in nodulation and plant growth as the response to the inoculation treatment. Additionally,

commercial plots were established with farmers interested in use of this inoculant in their commercial plots.

More than 600 kg of a *Rhizobium* inoculant mixture of three effective strains were prepared at the EAP–Zamorano facilities (see Table 6). This inoculant was used to prepare nearly 150 doses of 500g and 3,500 doses of 150g of *Rhizobium* inoculant that were provided to our collaborators from Honduras and Nicaragua (INTA) during FY12. To support inoculant production in Guatemala for the *postrera* season, 200 kg of Canadian peat was provided to our collaborators from ICTA (Table 3). The larger doses (500g) are being used in bean commercial production plots for technology dissemination, and the smaller doses (150 g) are for distribution along with the qualified seed packages that are distributed to beneficiaries of the RBTD project.

Table 6. *Rhizobium* inoculant distributed to collaborators for the *primera* and *postrera* planting seasons of 2012

Collaborator	Doses of 500 g	Doses of 150 g	Peat (kg)
DICTA	30	500	
PRR	50	300	
FIPAH	40	200	
Others	25	500	
INTA (Nicaragua)		2000	
ICTA (Guatemala)		20	200

Forty-eight packages of 150g of *Rhizobium* inoculant were provided to Mr. Edgardo Navarro, Coordinator of the FAO–Regional Seed for Development Project in Honduras. Each package will be used to inoculate 20 pounds of bean seed to establish demonstration plots in different locations throughout Honduras.

Training activities

The following training activities were carried out during this year by the EAP–Zamorano team.

Seed Production and conditioning

- Fourteen technicians from INTA/Nicaragua, ICTA/Guatemala, DICTA/Honduras and NSS/Haiti, and from PRR, FIPAH, CRS and other partner organization from Honduras participated at the "Seed Production, Conditioning and Storage Workshop" offered at EAP–Zamorano, in collaboration with Mr. Edward Moncada, Seed Plant and Laboratory Unit, August 28–30, 2012.

- Practical training courses on seed production and seed conditioning were offered by PRR and FIPAH technicians, with support of EAP–Zamorano, to farmers from the Yojoa Lake and Yorito–Vallecillo regions involved in qualified seed production. This training was offered during the stages of production in the field and seed conditioning in local facilities to obtain good quality seed.

***Rhizobium* technology**

- A regional workshop on *Rhizobium* and inoculation technologies was offered to technical personnel from Honduras, Haiti and Guatemala at EAP–Zamorano from November 22–25, 2011. Although it took place during Year 3's timeline, the training was covered by funds from Year 2.

- A workshop on *Rhizobium* and inoculation technologies was offered to technical personnel of ICTA/Nicaragua, DICTA/Honduras, and NSS/Haiti at EAP–Zamorano (March 5–8, 2012).

- Minicourses on Bean *Rhizobium* Technology were offered at EAP–Zamorano to FIPAH technicians and farmers from CIALs of the Yorito and Vallecillo regions (May 2012), and to PRR technicians and farmers from CIALs of the Yojoa Lake region (June 2012).

- Three *in situ* minicourses on Bean *Rhizobium* Technology were offered to more than 90 technicians and farmers from the southern region in collaboration with CARE/CIAT in August 2012.

Rhizobium multiplication training at Zamorano

Monitoring and evaluation
Most activities involving seed production and distribution with collaborators and farmers have been recorded using a format template developed by MSU for M&E of the project. Information recorded on Year 1 and part of Year 2 was provided to the DGP CRSP Management Office (MO).

Most qualified seed produced in the *primera* planting season of 2012 will be distributed during the second part of September and in early October 2012. Due to the time needed for collecting and processing the information for the second year M&E report, this will be ready by early November 2012.

On September 23–24, we received the visit of Drs. Irvin Widders, Luis Flores and Celina Wille from MO. Part of this visit was to update information on project activities in Honduras and to assist other collaborators. Ana Vargas, project assistant, provided the visitors with information related to the RBTD Project.

DICTA Activities
DICTA has worked in the departments of Atlántida, Copán, Lempira, Ocotepeque and Olancho with the goal of reaching a total of 5,000 beneficiaries. From the total list of beneficiaries, approximately 3,000 are directly receiving 10 kg of bean seed varieties project interest each, while the other 2,000 are being reached through 30 local community seed banks (BACLs). The CSBs are located in different regions with 17 in the west region, eight in Olancho and five in the Atlantida. The CSBs are also in charge of disseminating the *Rhizobium* inoculum to their members.


CEDA facilities to reproduce registered seed from genetic stocks

Registered seed production
Different varieties among which Amadeus-77, Cardenal, Carrizalito, Deorho and Tío Canela were multiplied in one manzana each at the Centro Entrenamiento y Desarrollo Agrícola (CEDA) in Comayagua. The production obtained was 106.2 cwt. (4.8 ton) of registered seed. With this seed stock, Year 2 activities under the BTD Project began.

Identification of seed multipliers
Through this activity DICTA has increased the knowledge of seed production and favored family groups of small-scale enterprises of artisan seed production (see Table 9). This

project has allowed DICTA to identify excellent procedures and human capacity within the rural area. Below we list the different seed multipliers who have been duly supervised by DICTA during Year 2.

Table 7. Established CSBs in Honduras in Year 2

17 BACLs ***Región Occidente***

- Superación Campesina, Plan de la Púa, Lepaera Lempira
- Caja rural (CRAC) Los Jazmines, Alto Guateque, Gracias Lempira
- CRAC Dios es Amor, Llanito Verde, Gracias Lempira
- CRAC Los Pinares, El Pinal Mejocote Gracias Lempira
- COPRAFIL, La Iguala Lempira
- Colegio Ramón Rosa, Gracias Lempira
- Mi Buen Pastor, El Carmen Lepaera Lempira
- E.A.C.* Barrio Santa Rita, San José Copán.
- CRAC Flor de Campo, Agua Caliente, Corquin Copán
- CRAC Fe y Esperanza, El Campanario, La Jigua Copán
- CRAC Peñas Dos, Santa Rita Copán
- CRAC Superación Maya, Cabañas Copán
- UNIOSEN El Sixe, Sensenti Ocotepeque
- COPRASEL El Sixe, Sensenti Ocotepeque
- ESENVA, El Barrial, La Labor Ocotepeque
- UNEDESOLA, Los Amates, La Labor Ocotepeque
- CENOC, Sinuapa Ocotepeque

8 BSCs ***Departament of Olancho***

- 1 Caja rural "Esfuerzo de Todos" en el Dictamo, Municipio La Unión
- 2 Escuelas de campo de la UNA, Catacamas, Olancho
- 1 Asociacion productores Las Minas Potrerillos
- 1 Caja rural "El Diamante" Municipio Campamento
- 1 Caja rural Las Gemelas, Yocón
- 2 con grupos de Diaconía Nacional en Los Charcos y Coyolar Tilapa, en los municipio San Francisco de la Paz

5 CSBs ***Department of Atlántida***

- 1 Mezapita, Arizona
- 1 Quebrada bonita, Cuenca del Rio Cangrejal
- 1 Jutiapa, Atlántida
- 1 Grupo Santa Fe, Subirana
- 1 Bayas, Balfate Colon

*E.A.C.= Empresa Asociativa Campesina

In the department of Olancho

- Lilian María Galeano (Jutiquile)
- José Cristóbal Padilla Paguada (Jutiquile)
- Lucas Antonio Carias (Jutiquile), El Guayape seed production group
- Rubín Oney Cárcamo (Gualaco)
- Roberto Vallecillo Rivera (Bijagual)
- José Amílcar Cubas Ruiz (El Cortes Potrerillos), Rural bank Amor y Lucha
- Oscar Rutilio Calix (Gualaco)

Western region

- E.A.C. Los Pinares en El Rodeo El Pinal, Gracias, Lempira represented by Mr. Leónidas Benítez Molina
- E.A.C. Roque Ramón Andrade, Colonia Canciras Sensenti, Ocotepeque represented by Mr. Juan José Fuentes Torres
- E.A.C Oscar Mejia Guerra, San Antonio Mercedes, Ocotepeque represented by Mr. Mauro Alixander Ventura
- E.A.C APANAl en el Naranjito, Santa Barbará y representada por Sr. Germán Danilo Pérez
- Empresa de Semilla SOL, localizada en Valladolid Lempira represented by Mr.. Cayetano Menjivar
- E.A.C. La Flor en San Marcos Caiquin, represented by Mr. Reginaldo López,

The five hundred bags which will benefit an equal number of producers in the department of Atlantida were produced in the Western Region since reputable seed producers could not be identified in the department of Atlantida. DICTA was also discouraged from multiplying seed in this region because the weather conditions tend to be very humid, favoring fungal and bacterial disease.

Seed dissemination activities

Seed dissemination activities in different regions are marked by several challenges. First, the remoteness of some communities forces the DICTA team to plan ahead in order to have reliable transportation for the heavy seed. Second, the work of disseminating seed has to take into account very specific dates. Arriving at communities even earlier in the season than necessary is recommended, but the seed is not always available from seed multipliers. Arriving too late is simply not an option. DICTA tries to arrive early in order to hold good conversations with beneficiary groups on the importance of the project, the goals of bringing regenerated genetic material and to gather the monitoring data as part of the commitment to the MO. In the department of Olancho the task is always extra difficult because it involves long distances and a culture of beneficiaries that is more and more reticent to collaborate in groups. Despite the challenges, a total of 1,139 farmers have been reached this year, with 172 bags still pending the confirmation of the beneficiary names and locations. DICTA was able to arrive to this region on time, since the best time for planting beans in Olancho starts in August and continues to the beginning of the first week of October.

Dissemination in the Western Region and the Department of Atlantida are still in the process of delivery of the seed. This data will be presented to the MO during the month of December.

Training on Community Seed Banks (CSBs)
A delegation of technicians and farmers traveled to the Republic of Nicaragua early this year to learn about the experience of implementing local community seed banks. Personnel from DICTA from different locations attended: six from Ocotepeque, two from Copan, six from Lempira, one from Intibucá, two from Olancho, four from Comayagua, five from Francisco Morazán and two from Litoral Atlántico. The immediate result of this activity was the creation of CSBs as shown in tables 7, 8 and 10.

DICTA officials, technicians and lead farmers visit three CSBs in Nicaragua in early January 2012.

DICTA trains leader farmers on seed conditioning techniques in Olancho.

Training activities included seed conditioning activities in the CSB "Amor y Lucha" in Cortes, Jutiquile and Las Tablas, Guayape, department of Olancho. Other training activities are listed below:

- One open field day in the seed multiplication plots at CEDA with producers of APROARCO and agronomy students from CURC, of the certificate program in agribusiness in collaboration with the WFP and DICTA
- One open field day with producers of the association Regantes de Guangololo in Comayagua

- Ten training events for producers in areas of crop management (planting density, fertilization, pest control).
- Eight training sessions with seed multipliers addressing seed drying, sorting and final conditioning.

Farmers teach innovative planting techniques to leader farmers.

Table 8. List of CSBs in Olancho

#	Beneficiary Organization	Location
1	Caja Rural las Gemelas de FUNDER	Calpules del muni
2	Caja Rural Esfuerzo de Todos	Díctamo municipi
3	Caja Rural el Diamante (DICTA)	Campamento
4	Banco de Semilla Coyolar Tilapa	Coyolar Tilapa, m Francisco de la Pa
5	Banco de Semilla los charcos	Los Charcos, Mun Francisco de la Pa
6	Asociación de Productores la Mina Potrerillos	La Mina Potrerillo Juticalpa
7	Escuelas de Campo de la Universidad Nacional de Agricultura	Catacamas, terren
8	Escuelas de Campo las Mesetas Universidad Nacional de Agricultura	Catacamas las Ma

Table 9. Seed multipliers in Wester n Honduras

#	Group Name	Location	Productio (cwt.)
1	CRAC Los Pinares	El Rodeo El Pinal Gracias Lempira	47
2	E.A.C. Roque Ramón Andrade	Col. Canciras Sensenti Ocotepeque	47
3	E.A.C. Oscar Mejía Guerra	San Antonio Mercedes, Ocotepeque	77
4	E.A.C. APANAL	Naranjito, Santa Barbará	120
5	Empresa de Semilla SOL	Valladolid, Lempira	32
6	E.A.C. La Flor	Agua Blanca, San Marcos Caiquin, Lempira	77

Table 10. CSBs in Western Honduras

#	Group Name	Representative	Location
1	Superación Campesina	Calixto López	Plan de la Púa, Lepaera Lempira
2	CRAC, Los Jazmines	José María Miranda	Alto Guateque, Gracias Lempira
3	CRAC, Dios es Amor	Benigno Pineda	Llanito verde, Gracias Lempira
4	CRAC, Los Pinares	Melvin Orlando Benítez	El Pinal Mejocote, Gracias Lempira
5	COPRAFIL	Ovidio Cortez Suate	La Iguala, Lempira
6	Instituto Ramón Rosa	Salomón Guerra Miranda	Gracias Lempira
7	Mi Buen Pastor	Reinier Marlen Pinto	El Carmen Lepaera, Lempira.
8	EAC Barrio Santa Rita	Froilán Aparicio	San José, Copan
9	CRAC Flor del Campo	Fredy Omar Vicente Peña	Agua Caliente, Corquin Copan
10	CRAC Fe y Esperanza	Filiberto Benítez	El Campanario La Jigua Copan
11	CRAC Peñas dos	Eugenio Rosa	Peñas 2Santa Rita, Copan
12	CRAC Superación Maya	José Adelmo Rivera	Cabañas Copan
13	UNIOSEN	Omar Rivera	El Sixe Sensenti, Ocotepeque
14	COPRASEL	Jorge Alberto Gómez	El Sixe, Sensenti, Ocotepeque
15	ESENVA	Benjamín Santos	El Barrial, La Labor Ocotepeque
16	UNEDESOLA	Francisco López	Los Amates, , La Labor Ocotepeque
17	CENOC	Hugo Alex Arita	La Comunidad, Sinuapa Ocotepeque

INTA-formed CSBs hold a seed-delivery event to their members in the Segovias Region.

NICARAGUA

INTA has worked against unprecedented negative climatic conditions this year. This has resulted in major delays in the *postrera* and *apante* planting seasons. While the results for the *apante* crop will not be recorded until March and April of 2013, the progress reached so far is summarized below.

- The goals of establishing CSBs in all regions have been met.
- At least 60% or 1489 cwt. of the seed programmed to be produced this year has been done.
- At least 40% of the demonstration plots (with 20 pounds of seed) have been established, reaching a total of 3,814 farmers.
- 4. Disseminated seed reached 1,067cwt. or 53 of the project goals for this year (without counting the *postrera* season).

Production problems caused by drought led to poor seed production in optimal areas, but the results were worse in areas known for the least optimal agroecological conditions. Sometimes the affected areas were in the vicinity of other CSBs that did well despite the climatic conditions. In retrospect, INTA has determined that a number of CSBs that were affected by climate change this year also did poorly last year, when conditions were better. This experience has forced INTA to reconsider where CSBs should be established. With two years of experience, the decision to

favor those areas where demonstration plots (PDT) produced acceptable results helped define what CSBs need to be reinforced in Year 3. As a result, INTA now plans to leave marginal areas with repeated history of crop failure out of seed production and to focus on enhancing their food security with seed from other CSBs. In contrast, CSBs will be expanded where the history of success is strong and to produce enough seed for marginal areas.

In no other country targeted by the BTD project is the importance of the *apante* season as high as it is in Nicaragua. This is because of Nicaragua's extensive land resources in the northern and southern Atlantic planes and in the area of the Segovias. Understanding the dynamics of these three seasons is important, particularly that of *apante*. The *apante* crop in Nicaragua is considered more than one-third of the Nicaragua production and has the capacity to buffer consumer prices in the whole Central American region. The number of end beneficiaries of the CSBs is considerable and will be recorded in the months to follow as this season is targeted.

Table 11 summarizes the results to date on seed production and dissemination in Nicaragua. The results by region are further explained in later tables.

Table 11. Seed varieties disseminated to CSBs in Year 2.

Regions	Requested Seed by CSBs			Available Seed
	INTA Rojo	INTA Matagalpa	INTA Fuerte Sequía	INTA Rojo
PN	20	7.2	4.8	32
PS	0	0	32-0	32
CN	1.4	5.6	21.0	32
CS	3.2	0	0	32
SG	12.0	12	8.0	32
Total	37.6	22.8	65.8	160

Pacífico Sur

Partial results in the region help identify areas with higher yield potential, as set forth in the plateau and low yields in the cities of Granada and Rivas. Application has been made to expand the coverage of PDT with project funds to the Cárdenas area to increase the number of beneficiaries of the PDT. Production problems in the region had very irregular rains, especially in the pod-filling period, which had a severe effect on seed production and affected delivery for PDT.

Table 12 the summarizes the results in the South Pacific.

Table 12. Results obtained in South Pacific

Department	# CSB (2mz/each)	Grain production (cwt.)	No. Demonstration Plots	Yield/ cwt./mz
Carazo	7	118	235	16.9
Granada	5	20.0	30	4.0
Masaya	4	94.5	175	23.6
Rivas	4	8.0	0	2.0
Total	20	235.5	440	
Goals (mz)	40	600	2000	
Efficiency	100	39	22%	

Pacífico Norte

In the North Pacific region, areas with high production capacity for Cerro Rota and Puerto Morazan can be identified. In the municipalities of Sauce, San Pedro and Cinco Pinos, yields were low. In Santa Rosa del Peñon, the highlights show that CSBs require better organization and selection of productive zones. As shown in Table 13, the results obtained in this region were quite mixed.

Table 13. Production results by CSBs in the Pacifico Norte region

Departament	Municipality	Banks	Production	Media QQ/Mz
Leon	Cerro Rota	5	104.0	20.8
Leon	Sta. Rosa Peñon	12	6.82	0.57
Leon	El Sauce	6	17.0	2.8
Chinandega	Puerto Morazan	10	101.8	10.2
Chinandega	San Pedro	5	27.0	5.4
Chinandega	Cinco Pinos	5	28.5	5.7
	Resultados	43	285.12	
	Metas	40	400	
	Eficiencia	100	71	

Centro Sur

The South Central region includes an area that is traditionally involved in seed production (Santa Lucia Boaco). This area generally produces high yields during the *apante* season, particularly in Chontales. Seed production in Santa Lucia was very low this year due to the prolonged drought previously mentioned in this report. Other factors also affected the production but were not necessarily part of production and lack of compensation to the seed delivered in the previous year. One of these factors is the need for better organization. Farmers in the area are mostly young and single and lack the seriousness of other producers.

Chontales' traditionally high yields have been achieved mainly in the municipalities of San Pedro, Comalapa, Cuapa and Santo Thomas. An increase of CSBs in this area is justified, particularly if the *apante* season is targeted. Seed multiplication has an enormous productive potential in these communities. Table 14 illustrates the importance of these communities in achieving high yields.

Table 14. CSB production performance in the South Central region

	CSBs	Production	Seed	PDT
Departamento de Chontales				
Juigalpa	4	43	32	150
Cuapa	1	12	7	30
Acoyapa	3	11	11	54
San Pedro	4	87	79	200
Santo Tomas	4	46	41	245
Comalapa	4	62	42	195
Departamento de Boaco				
Santa Lucia	20	195	31	205

Centro Norte

The North Central region is one of the most productive in the country. This area is cultivated during the *primera* and *apante* seasons. It also includes other highly productive areas of predominantly severe drought conditions over time.

The adoption of CSBs in this region is very high and is identified with a lot of potential production areas, but no significant efforts have been invested in facilitating bean production technology in the region. It is important to outline, however, that the region also has areas with very marginal potential to high yields, particularly the communities of Terrabona, Darius, and San Isidro, Sébaco. These produce so little that they qualify for food security support programs and not for food production.

In this region Jinotega has the highest yield potential and can increase domestic production and requires a lot of support to develop the potential of the crop. Table 15 outlines the results achieved in this region.

Las Segovias

Bean production in the Segovias comes from two agroecologically different areas. One area is dry and includes the departments of Esteli (La Trinidad, Estelí, Limay, Condega, Pueblo Nuevo), and Madriz (San Lucas, Somoto, Totogalpa Telpaneca, Palacaguina). Agriculture in these areas is practiced for food security because precipitation is irregular and usually very low. In the second zone is the department of Nueva Segovia (Jicaro, Jalapa, San Juan de Rio Coco), which includes areas with high yield potential as demonstrated by the results where varieties can express their yield potential. The results indicate 344 cwt of seed were produced reaching only 57% of the established goal. A unique finding in this area is that INTA Fuerte Sequia is in the most in demand in the area, while INTA Rojo has no market at all. Table 16 outlines the results for this area while tables 17, 18 and 19 explain the country level performance in area planted and qualified seed produced.

Table 15. CSB results obtained in the North Central region

Department	Municipality	CSB	Production (MP)	Seed (cwt.)	PDT
Matagalpa	Darío	2	42	31	11
	Rancho Grande	1	11	11	50
	Sébaco	3	19	12	16
	Muy muy	1			
	San Isidro	4	12.5	4.5	25
	Matagalpa	2			
	San Dionisio	2			
	Esquipulas	3			
Jinotega	Yalí	7	169	116	200
	Jinotega	5	36.5	28	80
	La Concordia	4	29.5	33	85
	San Rafael	4	6.0	5.5	15
Total		40	353	272	532
Goals		40	600	400	2000
Effectiveness		100	59	68	27

Table 16. Results obtained in Las Segovias

Department	Municipality	CSB	Production (cwt.)	Seed	PDT
Esteli	San Nicolás	2			
	La Trinidad	2			
	Estelí	7	66	30	40
	Limay	1			
	Condega	1	52	50	56
	Pueblo Nuevo	2	27	12	54
Madriz	San Lucas	6			
	Somoto	3			
	Totogalpa	1			
	Telpaneca	9	75	69	77
	Palacaguina	1	10	10	25
	S. Juan Rio Coco	4	36	36	63
Nueva Segovia	Jícaro	1	19	17	40
	Jalapa	7	46	31	97
	Total	48	344	289	427
	goals	40	600	400	2000
	Effectiveness	100	57	72	21

Table 17. Total manzanas planted in Year 2

Region	Achievements	Goals	Efficiency (%)
Pacifico Norte	43	40	100
Pacifico Sur	40	40	100
Centro Norte	40	40	100
Centro Sur	40	40	100
Las Segovias	48	40	100
Total goals	214	200	
Efficiency	100	100	

Table 18. Total registered seed produced (cwt) during Year 2

Region	**Achievements**	**Goals**	**Efficiency (%)**
Pacífico Norte	306	600	51
Pacífico Sur	243	600	41
Centro Norte	353	600	59
Centro Sur	456	600	76
Las Segovias	350	600	60
Total	1489	3000	49
Total goals		3000	
Efficiency	50		

Table 19. Total qualified seed production per region in Year 2

Region	**Achievements**	**Goals**	**Efficiency (%)**
Pacífico Norte	144	400	36
Pacífico Sur	157	400	39
Centro Norte	272	400	68
Centro Sur	254	400	64
Las Segovias	240	400	
Total	1067		
Total goals	2000		
Efficiency	53		

The final performance of demonstration plots for all the regions is under review and will be developed at the end of the *apante* season in March 2013.

Mr. Jean-Louis, in Saint Raphael, Haiti, shows the high germination rate obtained from his bag of DPC-40 seed provided by the BTD project this year.

HAITI

After a troubling first year getting the program started in Haiti, the BTD project is proud to report that activities in Haiti have taken a positive direction toward meeting bean seed dissemination goals. At least 3,080 bags were distributed in the March–April campaign. This campaign of Bean Technology Dissemination in Haiti, launched at the beginning of July with 2 tons of bean seed DPC-40 purchased from CAU (Comite Agropecuario Unitario de San Juan) in the Dominican Republic and 90 kg of *Rhizobium* inoculum purchased from the University of Puerto Rico (UPR) and sent in two shipments; the first time we received 40 kg (1600 bags) and the second time, 50 kg (2000 bags); each bag contained 25g.

SNS promised to provide the project with 5 tons DPC-40 to add to the 2 tons purchased from CAU, so that we could disseminate a total of 7 tons DPC-40 in the July–August season. Wanting to start very early with the distribution and taking into account the planting season in the different areas targeted, SNS provided only 1.87 tons of what was available in storage. We were then allowed to disseminate a total of 3.87 tons (1707 small bags of 5 pounds) of bean seed DPC-40 and 42.7 kg (1707 bags of 25g) of *Rhizobium* through three departments of Haiti (North, Center and Southeast) with the collaboration of these partners: AAA, CECI, ACDI-VOCA, CROSE.

Sourcing seed from SNS in future seasons

The role of SNS as a provider of DPC-40 seed is slowly but steadily gaining momentum. In late August 2012 a meeting was held with SNS, represented by agronomist E. Prophète, to explore the viability of producing high-quality seed in Savane Zombi similar to the quality provided by CAU. The response was positive, and the first target season was established as December 2012. It was confirmed recently that seven tons of seed were successfully transferred to IICA for dissemination in early November. SNS is the national authority providing certified seed in the country. In collaboration with IICA, the fields are visited before purchase of the seed takes place. This verification is required as part of the project to ensure the accuracy of the transaction. For the BTD project, it is important to see more seed produced locally by SNS. Limitations in the past are related to available land and the risk of producing in a country highly prone to crop failure due to weather conditions.

Monitoring activities

One of the challenges the BTD project faces in Haiti is getting reliable and complete information on who receives seed. The reliance on a network of collaborators has worked this year and it is poised to improve as partners become more comfortable with the monitoring instruments. Nevertheless, situations have been encountered where a community leader is highly interested in assisting in seed dissemination but delivers a limited list of beneficiaries. Given the importance of tracking where the improved seed has been delivered, the MO has provided specific instructions to IICA and SNS to avoid these situations by asking for the lists of beneficiaries first.

The BTD project plans to return to Honduras and Guatemala to evaluate the project's impact using the data gathered by partners which details beneficiary names and coordinates. In Haiti this will not be pursued due to the cost of including a fourth country and because of weaknesses in getting an accurate database from which to draw a sample of the beneficiary population reliably. Tables 20 and 21 outline where the DPC-40 seed has been distributed this year in Haiti.

Table 20. Seed dissemination during the March–April season, 2012

Département	Zones de plantation en mars-avril	Institutions/zones d'intervention	Quantité de semence à distribuer par institution	Quantité d *Rhizobium* distribuer institution
Nord	Dondon, Limbé, Plaisance, Pilate, Grande Rivière, St. Raphael	Agro Action Allemande Saint Raphael	0.25T = 110 petits sacs de 5 pounds	110 sachet
Nord-Ouest	Haut-Piton, Anse-à-foleur, Bombardopolis	------		
Nord-est	Vallière, Ferrier, Mont organisé, Grand Bassin, Mombin Crochu, Ste Suzanne	--------		
Artibonite	Marmelade, Les Cahos	PIA Marmelade	0.5T = 220 petits sacs de 5 pounds	220 sachet
Ouest	Kenscoff, Fond Baptiste, Les Palmes	WINNER Kenscoff, Fond Baptiste	1T = 440 petits sacs de 5 pounds	440 sache
Sud-est	Jacmel, Seguin, Savane Zonbi, Thiotte, La Vallée, Cap Rouge	CROSE (Jacmel, Seguin, Savane Zonbi, Cap Rouge)	1.25T = 550 petits sacs de 5 pounds	550 sachets
		ACDI/VOCA (Thiotte, La Vallée)	1T= 440 petits sacs de 5 pounds	440 sachets
	Arreguy	Congrégation Sœurs Lauritas	0.5 T = 220 petits sacs de 5 pounds	220 sache
Nippes	Salagnac, Petite Rivière de Nippes	Caritas-Haïti (Petite Rivière de Nippes)	0.5T = 220 petits sacs de 5 pounds	220 sachets
		Centre de Salagnac/MARNDR (Salagnac) et Fonds des Nègres	0.5T=220 petits sacs de 5 pounds	220 sachets
Grande Anse	Pestel, Beaumont, Duchity, La hâte, Dame-Marie	Caritas-Haïti Pestel, Beaumont, Duchity, La hâte, Dame-Marie	0.5T = 220 petits sacs de 5 pounds	220 sachet
Plateau Centrale	Baptiste, Savannette	CECI Baptiste, Savannette	1T = 440 petits sacs de 5 pounds	440 sachet
Total :	----	-----	7T = 3080 petits sacs de 5 pounds	3080 sache

Table 21. Seed dissemination in Haiti for the season July –August 2012

Department (Region)	Partner Institutions	Area of Distribution	Quantity of seed distributed (pounds)	Quantity of *Rhizobium* distributed
North	Agro Action Allemande (AAA)	St. Raphael	425 small bags of 5 pounds	425 bags of 25 g
Center	CECI	Savanette	440 small bags of 5 pounds	440 bags of 25 g
		Thiotte	120 small bags of 5 pounds	120 bags of 25 g
Southeast	ACDI-VOCA	La Vallée de Jacmel	120 small bags of 5 pounds	120 bags of 25 g
		Cotes de Fer	224 small bags of 5 pounds	224 bags of 25 g
	CROSE	Jacmel	378 small bags of 5 pounds.	378 bags of 25 g
Total			1707 small bags of 5 pound: 3.87 T	1707 bags of 25g: 42.7kg

As the project reaches new communities, further monitoring and evaluation information has been gathered. However, the capacity to go back to the field and evaluate the performance of disseminated varieties does not follow a systematic program as in Nicaragua. IICA, our partner in Haiti, has only one project leader in charge of this activity and his capacity to travel to the field is not the same as a full extension program. Efforts to collaborate with SNS have been established, but their staff is also busy addressing seed issues in beans and other crops.

Haiti is a challenging place to work. Not only is the cost of doing business elevated, but the constant climatic events are capable of erasing the progress achieved in a full year of seed dissemination with one storm over three days. This is why the BTD program in Haiti operates with very realistic expectations on how far the program can get. After struggling the first year to source seed locally and get the program with SNS off the ground, the consensus in the MO is to focus on finding the best quality seed and reaching as many thousands of small farmers as possible.

Inoculated bean plant in Haiti in the hills near Saint Raphael, Northern Province, Haiti.

RHIZOBIUM INOCULUM DISSEMINATION

Through Dr. Consuelo Estevez de Jensen, the BTD project has led several efforts to disseminate *Rhizobium* inoculum, mainly in Haiti. Although common beans (*Phaseolus vulgaris*) are widely grown in Haiti, yields are low and any improvement will depend upon the increased use of disease resistant cultivars and fertilization. The use of inoculation with efficient *Rhizobium* strains can result in significant yield increases. However, soil nitrogen levels, phosphorus limitations and soil indigenous rhizobia are important factors that influence the response to *Rhizobium* inoculation. Common beans can nodulate and fix nitrogen with the *Rhizobium* species *R. tropici*, *R. leguminosarum* bv. *phaseoli* and *R. etli*. However, soil *Rhizobium* strains vary in

their ability to fix nitrogen and certain strains are more effective than others. In Haiti root nodules on bean plants are usually present in low numbers. Inoculation with efficient strains has the potential of increasing dry matter and grain yields. In a visit to common bean field in Sabane Zombi, nodulation on cultivar DPC-40 plants varied from 5 to 41 nodules. Inoculation with an efficient and competitive *Rhizobium* strain will help to sustain common bean production in Haiti.

In this study, the response of common beans to inoculation with different *Rhizobium* strains was evaluated. Field trials were planted in Juana Diaz, Puerto Rico (January 18, 2012) and in Damien, Haiti (December 16, 2011). The objectives were 1) to evaluate the effectiveness of inoculants produced with single strains and/or a combination of different *Rhizobium tropici* and *Rhizobium etli* strains (Table 22). The trial was arranged in a complete randomized block design with four replicates. Cultivars "Verano" (Puerto Rico) and Sequia 340 (Haiti) were inoculated with the different *Rhizobium* strains and strain combinations and planted in a Mollisol (Haiti) and in a Vertisol (Puerto Rico). The native soil rhizobia population was 10^3 and 10^1 cells/g of soil, respectively. The inoculants were prepared in October 2011.

Figure 1. A) Field trial in Damien, Haiti, B) Evaluation of nodulation, C) Preparing inoculants at the laboratory facilities at the University of Haiti

The seeds were inoculated before planting after moistening the seed with sterile water. The initial concentration of the inoculum was of 10^8 *rhizobia* cells/g of peat and this was confirmed using the most probable number technique using "Verano" seedlings transplanted in growth pouches with N free nutrient solution (Broughton, 1970). At 50% flowering stage nodulation, shoot and root dry weights were evaluated and, at maturity, grain yielded. In Puerto Rico all the inoculants with a single or a combination of *Rhizobium* strains increased nodulation (Table 22). There were significant differences when compared to the control NPK and N treatments. The mean nodulation score of *Rhizobium tropici* CIAT 899 in combination with the Isabela 1 strain was 5.7 (1–9 scale). Nodule size ranged between 1 and 3 mm diameter and most of these nodules were located in the upper 5 cm of the root (Fig. 2). Another combination of *Rhizobium* strains that produced outstanding nodulation due to the size and location of nodules was CIAT 899 and UMR 1597. Strain 1597 alone had a positive effect in dry matter and yield. Strains CIAT 899 in combination with all the tested strains had a synergistic effect on nodulation. The noninoculated control had the lowest number of nodules. It is important to point out that the use of both combinations of *Rhizobium* strains resulted in the highest grain yields along with the NPK treatment (Table 23). The noninoculated control had the lowest grain yield. See Table 22 for a summary of results.

Figure 2. A) Cultivar "Verano" nodulated with strains CIAT 899 and Isabela 1, B) roots of the noninoculated control; C) roots of the nitrogen treatment.

Table 22. Nodulation, shoot, root dry weights and yield after inoculation with *Rhizobium tropici* and *Rhizobium etli* in Juana Díaz, Puerto Rico, 2012

Inoculant	Nodulation score[1] (1–9)	Shoot dry weight (g/plant)	Root dry weight (g/plant)	Seed yield (g/plot)
Control	1.0 b	20.5 bc	2.4 b	819 d
NPK	**1.0 b**	**30.6 abc**	**2.5 ab**	**1,230 a**
Nitrogen	1.5 b	26.9 abc	2.5 b	1,102 ab
CIAT 899	5.0 a	23.8 abc	2.8 ab	939 abc
UMR 1597	4.0 a	35.6 abc	3.0 ab	1,110 ab
CIAT 632	5.2 a	14.8 c	2.1 b	683 d
UMR 1597 + CIAT 632	6.1 a	23.9 abc	2.4 b	862 bcd
CIAT 899 + UMR 1597	5.0 a	44.0 a	2.6 ab	1,121 abc
CIAT 899 + CIAT 632	6.0 a	22.0 abc	2.4 b	1,036 abc
CIAT 899 + Haiti 1	4.7 a	42.1 ab	3.8 a	1,105 ab
CIAT 899 + CR 477	5.2 a	22.7 abc	2.2 b	985 abc
CIAT 899 + Isabela 1	5.7 a	35.1 abc	2.1 b	1,126 ab
Mean	4.3	28.5	3.6	1,009

[1] Rated on a score from 1 to 9 where: 1 = < 10 nodules and 9 = > 80 nodules/plant

In the trial in Damien, Haiti, the response to inoculation using the same strains and combinations was evaluated (Fig. 2A and Table 23). The trial was planted in collaboration with the National Seed Program. The inoculation was carried out at the laboratory of Dr. Jean Fennel Felix of the University of Haiti, with the help of the Agronomists Carl Didier Joseph, Fanette Pierre Emilien, Noel and undergraduate student Demesvard (Fig. 2C). The evaluation of the experiment was conducted by Wesner Demosthene and an undergraduate student. A demonstration of the evaluation of nodulation was conducted during a visit of Dr. Juan Carlos Rosas and Dr. James Beaver (Fig. 2B). No differences in nodulation and seed yield among the NPK, Nitrogen;

inoculation with CIAT 899 + CIAT 632 Control; CIAT 899 + Haiti 1; the noninoculated control and UMR 1597 treatments were obtained (Table 24).

The lowest yields were obtained with inoculation with CIAT 899 + UMR 1597 and CIAT 899+ CR 477. Strain CIAT 899 inoculated alone had higher yields compared to other strains and the highest yield was obtained from the inoculant containing a combination of the Haiti 1 strain and CIAT 632 strains. The number of soil rhizobia in the field indicated the presence of a high number of *rhizobia* that was able to nodulate and produced good yields. This field at Damien had been planted in beans during the dry season for at least the past 20 years (Fig 2). The number of nodules did not differ among treatments and the application of fertilizer did not affect nodulation (Table 23). The results from this field trial indicate they may not reflect the performance of these inoculants in farmers' fields. A serological test will clarify the nodule occupancy by the strains inoculated.

Table 23. Nodulation, shoot, root dry weights and yield after inoculation with *Rhizobium tropici* and *Rhizobium etli* in Damien, Haiti, 2012.

Inoculant	Nodule number per plant	Nodule Diameter	Number of plants	Seed yield (kg/ha)
Control	18 a		35 ab	3,010 ab
NPK	14 a		44 a	3,532 a
Nitrogen	17 a		38 ab	3,430 ab
CIAT 899	12 a		38 ab	3,190 ab
UMR 1597	13 a		32 ab	2,687 abc
CIAT 899 + UMR 1597	12 a		25 b	2,040 c
CIAT 899 + CIAT 632	16 a		43 a	3,435 ab
CIAT 899 + Haiti 1	12 a		41 a	3,535 ab
CIAT 899 + CR 477	15 a		33 ab	2,647 bc
Mean	14.3		45.3	3,056

A demonstration of inoculation was carried out on December 15, 2011, in a growers' field located in a NGO near Mirebalais, Haiti (Fig. 3, below). Ten kg of seed was inoculated with the participation of 12 farmers, of which 10 were women. The inoculation was conducted with an inoculant that included a mixture of strains. The area covered was approximately 2,500 m^2. A similar area was left uninoculated. The data of the results of the inoculation will be available in the future. In December 2011, 97 bags of 100g inoculants with a mixture of strain *R. tropici* CIAT 899 and either strains CR 477 or Haiti were delivered to Agrotechnique.

Figure 3. Demonstration of the Inoculation with *Rhizobium* in common bean seeds with a group of farmers in Mirebalais, Haiti.

Inoculant Production

The inoculants were produced in 25g. bags with a peat carrier "American peat" imported from Minnesota. Table 24 shows the number of inoculant bags prepared during different months, the rhizobia strain used and the date when the bags were shipped to Haiti. The different strains used in the inoculants were grown in yeast-mannitol-agar (YMA) and multiplied in yeast-mannitol-broth (YMB) (Somasegaran and Hoben, 1994). The YMB media was contained in 300 ml bottles and 1 ml of a suspension of the culture at a concentration of 1.2 x 10^5 cells/ml was inoculated. The concentration of the broth culture was evaluated using the drop plate method using the dilution series of the strains inoculated, plate dilutions of 10^{-7}; 10^{-6} and 10^{-5} were prepared. The inoculated YMB was incubated in a shaker for 72 hours at room temperature (Fig. 2).

The inoculants were prepared in a ratio of 1:1 v/v, by incorporating the broth into the pasteurized peat followed by hand mixing to obtain a homogenized inoculant. The inoculant was left for 3 days to mature at room temperature and then bagged in white plastic bags. Inoculant quality was assessed using growth pouches with N free nutrient solution and Verano seedlings. The seedlings were inoculated with a suspension of a 10^{-8}, 10^{-7}, 10^{-6} and 10^{-5} dilutions of the corresponding inoculant (Somasegaran and Hoben, 1994). Inoculants were stored in an air conditioned room until shipping for no more than 45 days. During the past year, 7,600 bags of inoculant were produced in Puerto Rico and shipped to Haiti (tables 20 and 21).

Table 24. Chronology of inoculant production, strains and number of inoculant bags prepared for distribution to bean producers in Haiti.

Strains	Date of Preparation	Number of Inoculant Bags	Date of shipping
CIAT 899 + Haiti 1	September 2011	200	December 12, 2011
CIAT 899 + UMR 1597	November 2011	400	December 12, 2011
CIAT 899 + CIAT 632	November 2011	400	December 12, 2011
CIAT 899 + CR 477	February 2012	1,000	March 15, 2012
CIAT 899 + CIAT 632	February 2012	1,000	March 15, 2012
CIAT 899 + Haiti 1	March 2012	1,000	March 15, 2012
CIAT 899 + CIAT 632	April 2012	1,000	June 22, 2012
CIAT 899 + Haiti 1	May 2012	600	June 22, 2012
CIAT 899 + CIAT 632	June 2012	2,000	June 29, 2012
Inoculants produced	**Total**	**7,600**	08/2011–6/2012

Figure 4. Inoculant preparation: adding the broth culture with *rhizobia*, mixing the peat and the inoculum and 25 g inoculant bags.

In summary, the collaboration with UPR has led to a region-wide awareness about the importance of inoculum *Rhizobium* in the production of common beans. Among the highlights associated to the work led by Dr. Estevez are:

- Field trials planted in Juana Diaz Puerto Rico (January 18, 2012) and in Damien Haiti (December 16, 2011); inoculation of strains CIAT 899 and UMR 1597 resulted in outstanding nodulation due to the size and location of nodules.

- Strain 1597 alone had a positive effect in dry matter and yield. Strains CIAT 899 in combination with all the tested strains had a synergistic effect on nodulation.

- In Haiti the combination of strains CIAT 899 and Haiti 1 resulted on 3,535 Kg/ha yield compared to the noninoculated control 3,100 Kg/ha.

- A demonstration plot of 2,500 m^2 was planted in December 15, 2011, in Mirebalais, Haiti, with the participation of 12 farmers. A two-fold yield increased was obtained.

- For the second planting seasons in 2012, 7,600 *Rhizobium* 25g inoculant bags of inoculant were produced in Puerto Rico and were delivered to 7,600 small growers.

- For the third planting seasons, 4,000 *Rhizobium* 25g inoculant bags of inoculant were produced in Puerto Rico to be delivered to 4,000 small growers in December 2012. Table 24 summarizes the chronology of this production.

- In Sabanet Grower's common bean fields plated with cv. DPC-40, covering approximately 2.5 ha, showed response to inoculation. A threefold yield increase is expected due to use of quality seed and inoculation (see Fig. 4).

- A workshop was held at EAP–Zamorano, Honduras from 11–15 of November. The participants from Honduras (2), Guatemala (2), Costa Rica (1) and Haiti (2) completed a total of 32 hours of training. The training was organized in morning lectures and laboratory work. The trainees conducted 7 different laboratory exercises: 1) Isolations and characterization of *Rhizobium* and *Bradyrhizobium* from common beans, soybeans, cowpea and tepary beans; 2) Inoculation and evaluation of nodulation; 3) Most Probable Number for rhizobia soil quantification; 4) Multiplication of rhizobia and bradyrhizobia; 5) Preparation of inoculants; 6) Seed inoculation; and 7) Quality Control.

EAP–Zamorano monitoring visit to one beneficiary farmer, Mr. Jesus Lorenzo. Cedrón variety in Camasca, Intibucá. CIAL "Solidario Buenos Amigos" has been supported through the project in participatory breeding activities in a joint effort with EAP–Zamora

LESSONS LEARNED

Reliability of institutional partners in fast-paced initiatives

This year's major lessons learned came from two countries, Guatemala and Nicaragua. In the first case, we learned that there is little a program can do against changes in political and technical approaches when a new presidential period starts. We hope that ICTA managed to disseminate the seed according to plans, but at some point the program was at risk of not meeting its intended goals. Knowing how much weight the Pulse CRSP places on the importance of

NARs in our partner countries, we have learned that while contingency plans are ideal, thinking ahead or preparing for such problems is near to impossible.

Enhancing performance of CSBs with repeated success

In terms of lessons learned, Nicaragua has been a surprise, with a lagged production cycle and a further delayed *apante* season. One important lesson that came from the difficulties this year is that some CSBs tend to do better than others independently of how affected they are by climate. The reaction to this lesson is that a management decision has been taken to emphasize the number of support given to CSBs that work and to eliminate CSBs that have continuously faced crop failure as illustrated for all regions in Table 25. This is a better use of project resources, and INTA will be in charge of monitoring that those high performers have the capacity to serve those underperforming farmer groups with access to high quality seed. Table 25 offers a list of high performing locations and those with the least levels of performance this year.

Table 25. Areas with the highest and lowest performance indicators based on seed yield

Regions	High-performance locations	Low-performance locations
Pacífico Norte	Cerro Rota, Puerto Morazán	El Sauce, Santa Rosa del peñón
Pacífico Sur	Jinotepe, Masaya, Nindirí, El Rosario, La Conquista	Granada, Rivas, Masaya
Centro Norte	Yalí, La Concordia	Darío, Sebaco, San Isidro
Centro Sur	Juigalpa, San Pedro, Comalapa, Santo Tomás	Santa Lucía
Las Segovias	Jalapa, El Jícaro, Telpaneca, Estelí, Condega, Pueblo Nuevo	La Trinadad, San Nicolás, Totogalpa, Somoto

Responding to the needs of regions for specific varieties

Different regions have different growing conditions and require varieties adapted to these locations. For this reason the Pulse CRSP has developed several options available to farmers in the project. The recent climatic conditions faced in Nicaragua are the best test for a project's ability to customize varieties to what farmers need. The lesson learned is that, in the midst of a complex problem, one variety does not have all the solutions. The example of farmers that do not want to address drought problems, but at the same time have a variety that the market wants all the time, illustrates the challenge. In Nicaragua, some farmers have specifically said they do not want INTA Rojo because they have problems selling it, but at the same time they must work with the new climate change regime and compromise volume, price and productivity. The complexity of this problem has been taken into account and the best possible solution will be offered to farmers in Year 3, based on the available varieties.

Part of our Pulse CRSP management team visiting DICTA seed conditioning facilities in Tegucigalpa, Honduras, last September, 2012.

MANAGEMENT HIGHLIGHTS

Every year new challenges are faced and adjustments need to be made to manage a numerous set of partners. A lot of the challenges faced have been well addressed in good spirit and with the transparency and collaboration of all subgrantees. Some of the management highlights for this year are summarized below.

Regional meeting
A regional meeting was held in late May 2012 to plan the Year 3 workplans and define the strategies to maximize the project achievements in the last year of operation. All partners were present and expressed their strategies and points of view on issues from the cost of seed dissemination in Haiti and Guatemala to the follow-up activities planned with farmers. Overall, it was a productive meeting that set the stage for the timely write up of workplans and budgets. So far, only INTA is pending to develop a final version of the contract amendment for Year 3, since the originally proposed plans will need to be modified after the recent drought-created problems and the delayed *apante* season.

Monitoring and evaluation activities
Dr. Mywish Maredia and her assistant, David Deyoung, in collaboration with the MO, have initiated data collection activities for an impact evaluation assessment in Nicaragua. Data collection in Guatemala and Honduras will follow in early and mid-2013. Applying rigorous sample selection procedures to obtain the most representative sample of beneficiaries has been a learning experience for INTA and a few lessons learned in cleaning the datasets reported per year have been shared with INTA, DICTA, Zamorano and ICTA to expedite the data collection process in the field.

Budget execution
The budget execution has remained as planned at the end of Year 1, with no major revisions in sight. The request for a no-cost extension up to March 2014 will be officially requested from USAID with the commitment to remain budget-neutral.

For Further Information

Dry Grain Pulses CRSP
446 W. Circle Drive, Room 321
Michigan State University
East Lansing, MI 48824-1039
U.S.A.
Tel: 517/355-4693
Fax: Tel: 517/431-1073
Email: dgpcrsp@msu.edu
http://pulsecrsp.msu.edu/

Guatemala
Instituto de Ciencia y Tecnología Agrícolas (ICTA)
http://www.icta.gob.gt/

Honduras
Dirección de Ciencia y Tecnología Agropecuaria (DICTA)
http://www.dicta.hn/
Escuela Agrícola Panamericana (EAP-Zamorano)
http://www.zamorano.edu/

Nicaragua
Instituto Nicaragüense de Tecnología Agropecuaria (INTA)
http://www.inta.gob.ni/

Haiti
National Seed Service (NSS)
http://www.agriculture.gouv.ht/
Inter-American Institute of Cooperation in Agriculture (IICA)
www.iica.int