Mejoramiento Agrícola Sostenible de Frijol (Proyecto MAS)

Prime Award No. FCC-522-2012 2/031-00

Executive Report of Achievements
April to September 2014

Year 2

Contents

Introduction 3
A summary of the activities undertaken 4
Seed production and technical assistance to CSBs 4
Field monitoring of CSBs 6
Rhizobium Laboratory 8
Linkages with other partners and collaborators ..... **Error! Bookmark not defined.**
Comparing accomplishments with planned results and objectives 9
Trends recognized 11
Annex 11
Detailed report on area planted and yields obtained by CSBs, Summer 2014 12
Promotion flyers of bean varieties 13

Introduction

This report provides an account of the technical and project management activities for the project *Mejoramiento Agricola Sostenible* (MAS), under TechnoServe's leadership, from April to September 2014 . During this period, MSU-DICTA-TNS has continued to work toward project goals. In the early part of this period, completion of registered seed production through different seed multipliers and the establishment of Community Seed Banks (CSBs) were sought. Some CSBs were planted near the end of the summer (the *postrera tardia* season, from December to March); these CSBs did not provide a full account of their field results until April 2014. This planting choice was made because DICTA considers it highly important to have access to a well-stocked inventory of registered seed of bean varieties that are in high demand.

During this period, which has included high grain prices throughout the country, MAS received positive recognition from government agencies within the Ministry of Agriculture as the only project with available seed for certified seed producers. . The resulting high visibility that MAS received created \an opportunity for the Community Seed Banks to sell their seed and in several instances, their grain as commercial seed for prices above L 1800/qq. MAS's coordination with DICTA has placed the project at the center of the discussion for future registered and certified seed plans. MAS's goals are to provide registered and certified seed to public and private sector leaders to facilitate the next round of grain production. While these goals may not affect an immediate solution to grain scarcity and high consumer prices, they have assured that high quality germplasm has been available for the Honduran farmers for whom it was developed. The details of these advances will be presented in the report.

Field monitoring and customized technical assistance to CSBs has also been conducted almost daily. Under DICTA's coordination, a field agronomist specializing in bean seed production directs CSBs through the production process in preparation for the CERTISEM audits. CERTISEM applies the National Seed Law and inspects all fields to ensure that registered and certified seed complies with all phytosanitary measures. More than 85 percent of the CSBs that have invested in seed production have successfully passed CERTISEM audits. When farmers do not comply with CERTISEM technical criteria, the field's production is sold as grain. MAS's intervention can be measured in the number of CSBs that achieve seed certification. Through the CERTISEM process, farmers learn the exacting differences between producing seed and producing grain. Concurrently, they learn to master new skills in agronomic practices that are easily transferrable to grain production to increase yields. CSB leaders tell us that these farmers have welcomed the newly knowledge acquired through on-site field support, which has materialized h

The project's current period also provided an opportunity to complete an ambition long-shared with the Purchase for Progress (P4P) program of the World Food Program). A 6 x 8m *Rhizobium* multiplication laboratory was rehabilitated at the DICTA-CEDA facilities in Comayagua and will be put in full operation during the month of November 2014. It is noteworthy that MAS has not contributed directly to the purchase of laboratory equipment and facility conditioning but

will assume responsibility for making the laboratory operational with one technician, one assistant, and the purchase of supplies. This is a circa $11,000/year investment. DICTA's provision of physical space, electricity, and maintenance will amount to a similar contribution per year.

The impact of this activity is four-fold. First, MAS will be able to access a 500g dosage? of *Rhizobium* inoculum for circa $3.75— sufficient for 1.72 acres of seed or grain production and currently less than half the price paid at Zamorano. Second, with in-house capacity to multiply *Rhizobium* inoculum, DICTA will be able to approach more farmers willing to try this technology, which hasnot occurred previously at such a massive scale because of the logistics and the high input cost of producing inoculum. Third, the cost of chemical fertilizer is prohibitive for many small farmers producing beans; therefore, accessing *Rhizobium* inoculum at a low cost may be the only way to bring more nitrogen to their crops. Fourth, the potential for DICTA to sell this technology to an expanded network of medium- and large-scale farmers will provide a steady source of income for the laboratory's long-term sustainability. Advanced farmers already know about *Rhizobium* inoculum and its benefits, both for increasing yields with a low input cost and improving the quality of soils without chemical fertilizers.

MAS's work in Honduras's bean sector has generated keen interest among an extensive network of institutional collaborators—from private sector operators in the agriculture input markets to the Mesoamerican Famine Early Warning System (MFEWS). The Mejoramiento Agricola Sostenible project is satisfied with DICTA's recognition as a central source of registered seed that had been previously limited to the Bono Productivo initiative of the Ministry of Agriculture. With no Bono Productivo in sight under the DICTA budget for 2015, the seed stocks that have been produced with MAS's contribution will respond to the demand from different CSBs and other private sector operators. MAS's work during this period has been strongly coordinated with Zamorano—from the sourcing of basic seed to the purchase of *Rhizobium* inoculum used with leader farmers associated with CSBs. Zamorano has agreed to provide in-house, hands-on training to the new CEDA *Rhizobium* Laboratory technician, who will study for three weeks to one month at Zamorano under Dr. Juan Carlos Rosas's supervision before the first batch of inoculum is multiplied in those facilities. Continued support will be provided to double check the quality of the inoculum and share other techniques in soil fertility improvement, such as formulation of green fertilizers and basic soil analyses.

A summary of the activities undertaken

Seed production and technical assistance to CSBs

The MSU-DICTA collaboration under MAS has created a framework for stronger bean seed production to serve different seed markets in Honduras. In order to produce certified quality seed at the CSB level, the provision of registered seed is necessary; indeed, it is a CERTISEM requirement prior to their granting authorization to commercialize certified seed. During April 2014, the final account of registered seed production reached 525qq,

which would suffice to produce circa 700 manzanas of certified seed. Tables 1 and 2 show the total production from the field and the final amount of quintals after cleaning.

A 90 percent yield after processing is highly desirable because it indicates that the seed came from the field with few impurities, broken grains, or foreign materials. The 10 percent drop is strongly correlated to weight loss since humidity has to be standardized at 12 to 14percent. The protocol of processing seed at authorized facilities guarantees that the controlled storage at this humidity will keep important seed characteristics, such as germination rate, preserved for a longer period of time. The latest germination test performed during the last week of September 2014 shows the rate at 98 percent for all MAS seed.

Table 1. Registered Seed Production Summer Season 2014

Variety	**Quantity (qq)**
Deorho	332.77
Carrizalito	217.30
Amadeus 77	64.30
Total…	**614.43**

Table 2. Seed Production Final Processing Summer 2014

Variety	**Quantity (qq)**	**Yield (%)**
Deorho	285.00	85.64
Carrizalito	183.20	84.21
Amadeus-77	57.50	89.42
Total…	**525.70**	**Ave. 89.95**

Field monitoring of CSBs

Under the MAS project, the monitoring of CSB fields has been conducted consistently and intensively. Field monitoring is the main responsibility of MSU-DICTA field technician Elder Argeñal and DICTA's project manager Ricardo Salgado, who assure that the CSBs are following the technical recommendations provided to ensure high quality seed production during their regular field visits. A field's phytosanitary status, free of weeds and with strong plant vigor, mirrors the certified seed production learning process achieved by the CSBs farmers.

The number of CSBs visited at the beginning of this cycle is presented in Table 3, while the active CSBs during the *primera* planting season (May 2014) are presented in Table 4. Table 5 presents an account of CSBs that will be planting in the *postrera* season of 2014, with harvest forecast for 2015.

Table 3. Summary of Expected Seed Production in Postrera 2014

Department	Municipality	Variety	Area (Mz)	Expected Production (qq)
Olancho	Juticalpa	Amadeus	22	396
Olancho	Silca	Carrizalito	2	36
Olancho	Catacamas	Amadeus	8	144
Olancho	Yocón	Carrizalito	8	144
Olancho	San Francisco de la Paz	Carrizalito	3	54
Olancho	Catacamas	Amadeus	6.5	117
Olancho	Catacamas	Carrizalito	13.5	243
Olancho	Catacamas	Amadeus	33.5	603
Francisco Morazán	Cantarranas	Undetermined	63	360
Expected Total			**139.5**	**2,511**

Table 4. Community Seed Banks (CSBs) Established in Summer 2014

Department	Municipality	Communities	CSBs	Beneficiaries	
				Producers	Group
El Paraíso	Danlí, El Paraíso Morocelí, Yuscarán	Arauli, Linaca, El Tablòn El Barro, Los Limones, Montañitas, Chirinas, El Matazano, El Capulin, El Zapòtillo, Conchagua, Los Terrones, El Ocotal, Los Limones	22	17	0
Olancho	Juticalpa, San Francisco de la Paz, Catacamas, Manto Silca	La Empalizada, Juticalpa, Guacoca, Gualiqueme UNA, Catacamas Colonia Agrìcola, El Portillo, Manto Los Ranchos, Guacoca Guayape	29	19	2
Francisco Morazán	Orica, Cantarranas	Orica, Yamaguare, Guaricayàn	18	15	0
Comayagua	Comayagua, Siguatepeque	Flores, Meambar	2	2	
Yoro	Sulaco	El Jaral, La vega, Torondones	3	2	1
5	**14**	**34**	**74**	**55**	**3**

Table 5. CSBs Supported during *Primera* Season 2014

Department	Municipality	Communities	CSBs	Beneficiaries	
				Producers	Groups
El Paraíso	Danli, Trojes	El Tablòn, San Marcos Abajo, El Zapotillo, San Josè de Yamales	4	4	0
Olancho	Juticalpa, Yocòn Silca	La Empalizada, Juticalpa Guacoca, Gualiqueme UNA, Catacamas, Colonia Agrìcola El Portillo, Manto Los Ranchos, Guacoca, Guayape	9	7	0
Francisco Morazán	Orica, Cantarranas	Orica,Yamaguare. Guaricayàn	9	7	0
3	**7**	**19**	**22**	**18**	**0**

Rhizobium Laboratory

MAS has successfully coordinated with the World Food Program's Purchase for Progress the completion of a *Rhizobium* inoculum laboratory. The goal is to make it operational beginning in November 2014 and self-sustaining after a year, at least to cover materials and salaries for a two-person lab team. Operating a laboratory requires knowledge and equipment. With the equipment in place, MSU and DICTA will make the necessary investments to hire a professional microbiologist (already identified) and a lab assistant to learn the day-to-day operations technicques at Zamorano's laboratory.

Recent research and experience tells that the strains of *Rhizobium* to multiply are *Rhizobium tropici, R. etli,* and *R. leguminosarum.* While these strains will be inoculated on *Phaseolus vulgaris* genotypes and have provided strong *rhizobia* strain interaction, other strains will be sought after for soy beans already growing in Honduras. The effectiveness of inoculants produced with single strains and/or a combination of different *Rhizobium tropici* and *Rhizobium etli* strains have been evaluated extensively by Dr. Juan Carlos Rosas of Zamorano. Under Dr. Rosas's guidance, the laboratory will have access to up-to-date information on other potential strain combinations for use in different areas of Honduras. The laboratory will also conduct field research activities to compare results

when all the inoculants with a single strain or a combination of *Rhizobium* strains increase nodulation significantly. The comparison will be made to a noninoculated control and fields treated with the regular recommendation of Nitrogen Phosphorus and Potassium (NPK) or only Nitrogen (N) treatments.

The impact of this activity is four-fold. First, MAS will be able to access a 500g dose of *Rhizobium* inoculum for circa $3.75. This amount is enough for one manzana of seed or grain production and is currently less than half the price currently purchased for at Zamorano. Second, with in-house capacity to multiply inoculum DICTA will be able to approach more farmers willing to try this technology. This has not happened at a massive scale due to the logistics of producing inoculum and the high input cost. Third, the cost of chemical fertilizer is prohibitive for many small farmers producing beans; therefore, accessing Rhizobium inoculum at a low cost may be the only way they can bring more nitrogen to their crop. And fourth, the potential for DICTA to sell this technology to an expanded network of medium and large scale farmers will represent a steady source of income for the laboratory's long-term sustainability. Advanced farmers already know about Rhizobium inoculum and its benefits, both in increasing yields with a low input cost, as well as to the environment by improving the quality of soils without additional chemical fertilizers.

Comparing accomplishments with planned results and objectives

The production and dissemination of certified seed of improved bean varieties have been the main impetuses behind the MAS project. Through access to improved bean varieties, farmers are better able to work with current soil fertility and agroclimatic conditions than with seed from undetermined sources. MAS has set very ambitious goals for the short term, targeting CSBs with the capacity to multiply registered seed and disseminate certified seed to farmers. Under DICTA's field supervision, the goal of achieving sustainable production of certified seed of the varieties required by smallholder farmers has been systematically achieved in all targeted departments (Comayagua, Olancho, Yoro, Francisco Morazán, and El Paraiso), all of which can now access high quality germplasm.

Most MAS farmers who have planted these seeds have reported satisfactory yields, although the yields range varies from 8qq/mz to 30qq/mz, a difference is explained predominantly by soil

fertility and access to or lack of irrigation. Farmers generally report their production levels as acceptable because they are superior to growing beans from seed of undetermined sources.

Another prominent factor in achieving good yields and acceptable phytosanitary levels is training on integrated crop management practices. MSU-DICTA technical support has provided knowledge and techniques to MAS junior and senior advisors and leader farmers so they can identify biotic as well as biotic threats to a crop's success. Farmers are focused on learning any practice that leads to yield-enhancing results, but their follow-up to recommendations is often limited by their resources. In some cases, farmers cannot afford the prescribed technology package to exploit their seed to the maximum potential. In other cases, natural reasons, such as water for irrigation, determines crop failure. Climate change is a factor in every production activity, but with access to irrigation a farmer can still manage to produce a profitable crop.

MSU-DICTA will continue to follow this role, bringing new techniques and fresh knowledge to the following training areas:

- CSB handling of certified seed
- Issues to consider before deciding to produce bean seed
- Production techniques recommended for bean seed
- Seed processing to ensure longer shelf life and high germination rates
- General characteristics of a bean plant
- Advantages and disadvantages of different bean growing seasons in Honduras
- Differences in production systems applicable to beans
- Understanding soil fertility and alternatives for fertilization
- Pests of economic importance in bean production and how to control them
- Diseases of economic importance in bean production and how to control them
- Weeds of economic importance in bean production and how to control them
- Harvesting beans
- Planning bean production for seed and for grain

When MAS embarked in organizing CSBs, it understood that the question of whether producing seed for the bean seed market was profitable (or not) was present in the minds of potential participants. The most prominent sustainability factor in the CSB model is, undoubtedly, having a market for seed. Project results to date indicate an increased awareness of the importance of planting certified seed because the quality of certified seed will result in favorable market conditions for participating CSBs. To date, the project has gone through two seasons of certified seed production in which overall bean grain prices have pushed seed prices to favorable levels. Farmers who sold their certified seed for L1800 and above are satisfied and motivated. Therefore, MAS plans to continue monitoring how CSBs feel about continuing their investment in bean seed production. MAS is also requesting that CSBs continue to grow seed with little project support during multiple seasons.

Trends recognized

During this period, Honduras went through a bean-price crisis that will only worsen in the next few months, if the drought in certain regions continues as predicted. The Government of Honduras (GOH) reacted by taking certain measures to avoid increased prices for consumers, but the results of their interventions (e.g., importing beans from Ethiopia) did not yield the expected results.

This situation has favored the market for seed prices since beans that were grown for seed have fetched prices of HNL2,500 and above, per quintal when sold as grain. This situation has motivated CSBs to keep planting because the upcoming season's price forecasts point to similar trends.

Another favorable condition for CSBs is that the Government of Honduras has not announced a Bono Productivo program for 2015. While many farmers have become aware of the benefits of the fertilizer and seed provided for free, there are also mixed feelings about such subsidies because they disturb the bean seed market. For instance, while a CSB expects to sell its certified seed to potential users in a given community, government officials are giving away certified seed grown by DICTA. This creates a discouraging situation because MAS discourse encourages CSBs to build a market for their certified seed.

The past few months have been an interesting period for the MAS project. High-level authorities in the Ministry of Agriculture are interested in the seed CSBs produce as a means to increase the country's capacity to produce more beans. For instance, the government is planning to produce 20,000qq of certified seed with private sector operators. It is estimated that this quantity of seed will allow the region to plant an area large enough to produce enough grain to offset the high consumer prices experienced this year. The government is offering willing certified seed producers a price guarantee of L1,000/qq with the caveat that those participating in this activity must acquire crop insurance. At this time, it is not clear whether private sector operators will take advantage of this government offer. Nevertheless, MAS is preparing its participating CSBs to produce seed during the next season since the probability of a good price looks promising.

If the MAS project succeeds in multiplying certified seed under the current CSB model, it will be interesting to evaluate how the government alternative of enlisting large, private sector producers will fair. The CSB model is based on growing seed as close to the farmer as possible, thereby eliminating additional transaction costs (additional transportation, middlemen, storage expenses, etc.). We in the MAS project plan to document our experiences in the next season so we can focus the discussion on the advantages of this model for the bean seed system in this country at the negotiating table in future planting years. The lessons learned from this exercise will be systematically shared with all stakeholders.

Annex

Detailed report on area planted and yields obtained by CSBs, Summer 2014

Producer	Variety	Area planted (Mz)	Production Total (QQ)	Yield (QQ/ MZ.)
Esteban Casco	Amadeus-77	1	30	30.00
Luis Quintanilla	Amadeus-77	1	12	12.00
Luis Quintanilla	Amadeus-77	1	8	8.00
Mario Elvir	Amadeus-77	6	48	8.00
Tomas Elvir	Amadeus-77	1.5	12	8.00
Patrocinio Mendoza	Amadeus-77	1	20.4	20.40
Martin Adolfo Sevilla	Amadeus-77	1	8.5	8.50
Santos Melesio Cáceres	Carrizalito	2.5	24	9.60
Jairo Fernando Aguilera	DEORHO			
Mariel Medina	Amadeus-77			
Gil Antonio Obando	Amadeus-77	2	34	17.00
Gil Antonio Obando	Carrizalito	1	28	28.00
TOTAL EL PARAÌSO		18	224.9	12.49
Edwin Antonio Espinal	Amadeus-77	0.5	5	10.00
Gumer Donain Espinal	Carrizalito	1	18	18.00
Francisco Eder Pagoaga	DEORHO	2	42	21.00
Francisco Gilberto Pagoaga	DEORHO	2	24	12.00
José Bustillo	DEORHO	1	10	10.00
Julio Hernandez	DEORHO	2	64	32.00
José Hernandez	DEORHO	1	16	16.00
Reynaldo Girón	DEORHO	3	45	15.00
Virgilio Gonzalez	DEORHO	1	15	15.00
Santiago Vasquez	DEORHO	3	42	14.00
TOTAL FRANCISCO MORAZAN		16.5	281	17.03
Alfredo Mejía	Amadeus-77	1	15.00	15.00
José Bayardo Mejía	Amadeus-77	1	14	14.00
Lucas Aguilar	Amadeus-77	3	36	12.00
Sergio Rivera	Amadeus-77	1	17.12	17.12
Alex E. López	Amadeus-77	1	16.2	16.20
José A. Valle	Amadeus-77	1	14	14.00
Frank Zúniga	Carrizalito	4.5	38	8.44
German David Chirinos	Carrizalito	5	40	8.00
Ricardo Ezequiel Maradiaga M.	Carrizalito	2	40	20.00
Santos Emilio Inestroza	Amadeus-77	1	14	14.00

Sociedad colectiva	Amadeus-77	1	18	18.00
José Romero	Carrizalito	1	18	18.00
Nulvio Martínez	Amadeus-77	2	28	14.00
Nulvio Martínez	Carrizalito	2	30	15.00
Angel Reinaldo Meraz	Amadeus-77	0.5	9	18.00
Pedro Amado Acosta	Amadeus-77	1	14.00	14.00
German Emilio Acosta	Amadeus-77	1	14	14.00
Moisés Acosta	Amadeus-77	3	42	14.00
José Avelino Alvarado (Papa)	Carrizalito	1	14	14.00
José Avelino Alvarado (hijo)	Amadeus-77	1	20	20.00
Lucas Carias	Carrizalito	2	42	21.00
Cristóbal Padilla	Amadeus-77	2	60	30.00
Carlos Montes	Carrizalito	1	26	26.00
Rosa Lidio Acosta	Amadeus-77	1	14	14.00
TOTAL OLANCHO		40	593.32	14.83
Miguel Aguilera	Amadeus-77	2	30	15.00
Visionarios de Sulaco	Carrizalito	1	11	11.00
Hernán Horacio Salguero	Amadeus-77	2	15	7.50
TOTAL YORO		5	56	11.20
TOTALES		**81.5**	**1,155.22**	**14.17**

Promotion flyers of bean varieties

Características agronómicas

-Arquitectura de la planta: Tipo arbolito, guía corta, carga vainas en la parte media a superior.

- Rendimiento promedio: 27 qq/mz
- Color y tipo de grano: Rojo brillante, largo y arriñonado.
- Distancia entre surco: 40-60 cm
- Semillas por metro lineal: 8 a 12
- Cantidad de semilla requerida: 65-70 lb/mz
- Días a flor: 36/38 días.
- Madurez fisiológica: 66/68 días.

Variedad de frijol rojo claro

resistente a enfermedades, tolerante a factores adversos de suelo y clima, de alto potencial de rendimiento.

Características agronómicas

- Arquitectura de la planta: Tipo arbolito, de crecimiento arbustivo indeterminado
- Rendimiento promedio: 28 qq/mz
- Color y tipo de grano: Rojo claro brillante, ovoide.
- Distancia entre surco: 40-60 cm
- Semillas por metro lineal: 8 a 12
- Cantidad de semilla requerida: 65-70 lb/mz
- Días a flor: 36-38 días.
- Madurez fisiológica: 68-70 días

Características agronómicas

- Arquitectura de la planta: Tipo arbolito, guía corta, carga vainas en la parte media.
- Rendimiento promedio: 35 qq/mz
- Color y tipo de grano: Rojo retinto, ovoide.
- Distancia entre surco: 40-60 cm
- Semillas por metro lineal: 8 a 12
- Cantidad de semilla requerida: 65-70 lb/mz
- Días a flor: 35-37 días.
- Madurez fisiológica: 68-70 días.

Características agronómicas

- Arquitectura de la planta: Arbustivo indeterminado de guía intermedia.
- Rendimiento promedio: 32 qq/mz
- Color y tipo de grano: Rojo claro brillante, ovoide.
- Distancia entre surco: 40-60 cm
- Semillas por metro lineal: 8 a 12
- Cantidad de semilla requerida: 60-75 lb/mz
- Días a flor: 37-39 días.
- Madurez fisiológica: 68 / 70 días.

Características agronómicas

- Arquitectura de la planta: Tipo arbolito compacto, poca guía.
- Rendimiento promedio: 27 qq/mz
- Color y tipo de grano: Rojo corriente, pequeño, alargado.
- Distancia entre surco: 40-60 cm
- Semillas por metro lineal: 8 a 12
- Cantidad de semilla requerida: 65-70 lb/mz
- Días a flor: 37-39 días.
- Madurez fisiológica: 68-70 días.