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Germplasm Improvement and On-Farm Adaptive Research Program Cooperative

Project Final Report

Presented to: Pan American Development Foundation
(PADF)

By: Centro Internacional de Agricultura Tropical (CIAT)
and
Hurricane Georges Recovery Program (HGRP)

October 2001

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CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

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Summary

The International Center for Tropical Agriculture (French acronym CIAT), initiated the project titled "Germplasm Improvement and On-farm Adaptive Research" after the signing of a subcontract between the CIAT and the PADF representatives on January 4, 2000. This subcontract, which outlines the project implementation, is funded under the Cooperative Agreement # 521-A-00-99-00072-00 concluded between PADF and USAID for the implementation of a socio-economic recovery program (*HGRP*) after the damages caused by hurricane Georges in Haiti, especially in the South and the Southeast Departments. The initial activities of the project consisted in the establishment of a project office in Port-au-Prince and the recruiting of its staff composed of one Engineer Agronomist, in charge of the coordination of the field activities, one Administrative secretary and one driver.

At the onset of the project, the agronomist in charge of coordinating the project activities made an orientation visit to the CIAT office in Columbia, from April 2 to April 16, 2000. This visit enabled him to become familiar with the activities of the Center in terms of research on different alimentary crops.

A series of activities have been carried out in the field, as part of the project implementation. A total of 51 trials for the overall crops were established in the following areas targeted by the project: Camp-Perin, Deron, Petit-Goâve, Duvillon, Lagade, Pérédo, Damien, and Meyer in the Grand-Goâve municipality. Trials were also established with Beans, Maize, cassava, and tropical forage crops. The most frequent causes of trial disqualification are damages caused by animals, dryness, thefts, etc. The following table highlights the distribution of the trials in the different intervention areas of the project.

Crops	Intervention areas										
	Camp-Perrin	Dé-ron	Petit-Goave	Duvil-lon	Cap-Rouge	Bois-Goujon	Platon Chapèl	Lagade	Pérédo	Meyer	Da-mien
Beans	7	4	1	0	4	1	1	5	1	3	0
Maize	6	2	0	0	0	0	0	0	1	0	1
Cassava	1	0	1	2	0	0	0	0	1	0	1
Forage	4	4	0	0	0	0	0	0	0	0	0
TOTAL	18	10	2	2	4	1	1	5	3	3	2

The evaluation sessions of the trials permitted the identification of materials with quite a high performance compared to the local agricultural vegetal varieties. Two bean varieties have drawn our attention, namely the *Tio Canela* and the *BAT 304*. Three (3) Hybrids of Maize and one variety with open pollination were selected. Seventeen (17) Forage species have also drawn our attention. They will be further evaluated under a new program in the same intervention areas. As for Cassava, we were not able to find quality buds showing high

performance and adapting to local conditions. However, several materials highly promising are currently being evaluated on the lands of the producers and action is being taken to complete the evaluation process for the benefit of the producers.

Activities of seed multiplication for varieties showing high performance have been conducted at the end of the project. These varieties will not only be distributed to farmers in the areas served by the program, but they will also be used to establish other trials in new strategic areas.

Introduction

The main goal of the CIAT Germplasm Improvement Project was to introduce and test improved varieties in the project intervention areas. Such varieties particularly include beans, cassava, maize, and tropical forage. Seeds of the selected varieties will be multiplied and distributed to farmers in the areas served by the program. Seed multiplication operations were entrusted to ORE (*Organisation pour la Réhabilitation de l'Environnement*), which is a firm that specializes in this area and partner of the HGRP program based in Camp-Perrin.

The final report of the project will address the following issues:

1. Trial establishment strategies
2. The actual evaluation of the trials
3. The main achievements
4. Training
5. Seed multiplication

1.- Trial establishment strategy in the field

One of the strategies extensively adopted in the implementation of the activities in the field is the collaboration with other local Institutions and Organizations, particularly those concerned by the implementation of the HGRP. Thus, meetings and discussions were held with some key NGOs, such as ORE, CECI, CRS, and PLAN International in order to define collaboration modes to be adopted in the implementation of the activities. Field visits were also conducted in the HGRP intervention areas, in the South and Southeast Departments. Several meetings were held with local organizations and leaders to plan the activities in the field.

The above-mentioned organizations played a key role in the selection of the plots to establish the trials and the producers-collaborators who are the owners of the trial plots. They assure a kind of joint management of the plot in the realization of farming practices. All the information related to the development and the performance of the tested materials is registered in a record called field record. In some cases, the producers-collaborators

participate in the collection of data such as those related to initiation date of certain farming practices.

2.- Crops evaluation

Very little work has been done over the past ten (10) years in the area of agricultural research by the CIAT in the country. This is particularly due to the structural and programmatic weaknesses that have always characterized the National Research System of the Ministry of Agriculture. Thus, the collaboration of international research centers played a key role in the few achievements in terms of varietal improvement. The liberation of new or improved varieties is not done at a pace corresponding to the different problems identified in the farmers' plots in the country.

The TAMAZULAPA bean variety was introduced and tested in the country about 15 years ago. It was found performant considering the realities of that time. Nowadays, this variety presents several signs of deficiency in terms of yields, because of genetic erosion problems it has undergone over the years, especially because no adequate maintenance work has ever been performed on this variety.

Over the past years, the CIAT has been developing several offsprings of Beans, which address several concerns of the farmers in Central America and in the Caribbean. Some of the offsprings are already experiencing preliminary tests in certain areas of the country and would be candidates to offer an alternative in the validation trials that will be established on the farmers' lands.

Once the trials are established, they are submitted to two types of evaluation: an evaluation during production and another one during the harvest. During the first evaluation, all the problems related to the susceptibility or the resistance/tolerance of the variety in regard to illnesses and pests are considered. These evaluations involve both local staff and technicians based at the CIAT Headquarters and are conducted independently for each crop tested separately.

2.1.- Beans

Two types of trials were established during the project implementation: "nursery trials" generally containing a significant number of accessions and pre-validation trials in rural areas where a number not exceeding 4 or 5 varieties were placed under observation.

Nursery Trials. These trials were particularly established in Camp-Perrin with collaboration from ORE. This organization agreed to make its farm in Camp Perrin available to the Project. It also permitted to establish such trials on relatively controlled land in Déron.

Eleven (11) nursery trials were established during the project implementation, including 5 in Camp-Perrin and 4 in Déron. The following table summarizes the related situation.

Areas	Trial	# of accessions	Sowing period	Remarks
Camp-Perrin	1	400	March 2000	19 materials with high performance
	2	36	July 2000	Abiotiques factors
	3	19	July 2000	19 materials selected out of 400
	4	36	March 2001	Resistance to dryness (site 1)
	5	19	July 2000	Potential against ALS
	6	36	March 2001	Resistance to dryness (site 2)
	7	289	March 2001	Offsprings-Potential parents
Déron	8	36	July 2000	Abiotic factors
	9	92	July 2000	Erected and Volubile Types
	10	41	February 2001	Volubile type
	11	100	February 2001	Erected type

Pre-validation trials

In collaboration with the farmers, pre-validation trials were established in rural areas, on relatively large plots, of an estimated surface of 100 m² per variety. A total of eleven (11) trials were established through the different localities in the Southeast and the West Departments during the two farming seasons in hillside areas, respectively in July 2000 and March 2001. Geographically, these trials were distributed as follows:

Areas	Trial	# of varieties	Sowing period	Remarks
<i>Pérédo</i>	1	6	December 2000	Farmer: Coleau Jn-François
<i>Lagade</i>	1	5	August 2000	Farmer : Gaston César
	2	5	August 2000	Farmer : Légenre César
	3	6	March 2001	Farmer : Gaston César 1
	4	6	March 2001	Farmer : Gaston César 2
	5	6	March 2001	Farmer : Légenre César
<i>Bois Goujon</i>	1	5	August 2000	Farmer : Guérissaint
<i>Platon Chapelle</i>	1	5	August 2000	Farmer : Molière Toussaint
<i>Cap-Rouge</i>	1	5	August 2000	Ilcéant Germain
	2	5	August 2000	Jézuel Eustache
	3	6	March 2001	Ramoncite Jn-Baptiste
	4	6	March 2001	Ilcéant Germain
<i>Petit-Goève</i>	1	6	December 2000	Joseph Saint-Cyr

Six (6) treatments were used in the trials during the August 2000 cycle. They were represented by three (3) improved varieties and two (2) witnesses including one (1) national, the TAMAZULAPA, and one (1) local. During the March 2001 cycle, four (4) improved varieties were used. Another improved variety known as BAT 304 or BRUNCA, which had an outstanding performance in the "nursery trials", joined the 3 other pre-validation trials. These varieties are described as follows.

TIO-Canela: Developed in Honduras by Escuela Agricola Panamericana Zamorano. Small shiny red grain, this variety is developed from cross breeding of DOR 483, DOR 364, and POMPADOUR (from the Dominican Republic). It is very resistant to the Golden Mosaic virus. In addition to being adapted to high temperature conditions, the TIO-Canela variety develops quite well under poor soil conditions.

DOR 364: Small dark red grain, this variety shows quite a high performance in terms of yield-grain, without necessitating significant quantities of inputs. However, it is less resistant than TIO to the Golden Mosaic Virus.

DOR 390: Black grain, this variety show good resistance to BGMV. Yields vary from average to good in acid soils, but they are relatively low in soils with low Phosphorus.

BAT 304 (Brunca) : Developed by the Bean Team in Costa Rica. Black grain, relatively premature and with a good potential of yield., this variety adapts to diverse ecosystems including areas with relatively poor soils. It has an intermediary level of resistance to the Golden Mosaic Virus.

The above-mentioned varieties were planted on plots covering a surface of almost 100 m². A form of local joint management is assured with the producer-owner of the plot in concert with technicians from PADF, which is an American NGO. Farming practices in these trials are not different from those commonly adopted by the producers in the intervention area.

It must be underlined that the BAT 304 variety was introduced only in the second cycle of trials after its high performance had been identified in the "Nursery Trials" despite its intermediary resistance level to the Golden Mosaic compared to the TIO CANELA. At that time, the number of treatments in the trials was increased by one (1), passing from 5 to 6 varieties.

2.2.- Cassava

The worldwide mandate of research on Cassava crop was entrusted to CIAT. Thus, in the host country, there are very performing varieties in terms of yields. However, the presence of a viral illness in Columbia called "FROG SKIN" prevents the introduction of any Cassava materials in the form of cuttings for fear of introducing the illness in Haiti. It must be underlined that no solution has been found yet against this illness.

Consequently, an alternative we are satisfied with is the use of cuttings from the Dominican Republic and Cuba where relatively interesting researches were conducted on the Cassava

crop. Thus, six (6) varieties with high yield and adaptation potential were introduced in Haiti under the HGRP program. These varieties are identified with the following names:

- NEGRITA de Bani
- AMERICANITA
- LLANERA
- NIÑA
- BARAHONERA and
- YEMA de Huevo

In addition, five (5) new varieties from Cuba and Panama joined the six other varieties introduced from the Dominican Republic in the multiplication plots, which will be established in Damien. The newly introduced improved varieties are identified with the following names:

- Cemsa 74-725
- Cemsa 74-6329
- Señorita
- Inivit Y-94-4
- CMC-40

Because of the relatively long vegetative cycle of the Cassava, only one group of trials was established in the different intervention areas of the project. Harvest operations and final evaluations of these trials will start in November 2001.

To overcome the "FROG SKIN" illness problem, vitro-small plants of Cassava, with no evidence of the illness and free of risk, were introduced from 19 materials among those that showed the best performance from Columbia and the genetically pure CMC-40.

2.3.- Maize

Nine (9) Maize "Nursery trials" were established throughout the different intervention areas of the project, as detailed in the following table:

Areas	Collaborator	# of varieties	Sowing period	Remarks
<i>Pérédo</i>	Coleau Jn-François	7	April 2001	Yellow grain variety
<i>Damien</i>	Farm of the Ministry	7	May 2001	Yellow grain variety
<i>Camp-Perrin</i>	ORE	14	August 2000	Yellow premature tropical offsprings
	ORE	18	August 2000	Offsprings with high percentage of protein
	ORE	25	August 2000	Yellow tropical hybrids
	ORE	16	August 2000	Yellow premature tropical hybrids
	ORE	10	August 2000	Simple cross breeding hybrids
	ORE	?	August 2000	Acid soils
<i>Déron</i>	ORE	?	Sept. 2000	Acid soils

2.4.- Forage

Another activity carried under the project is the establishment of forage trials in view of the selection of some varieties that could be used by the producers-animal raisers for soil conservation and animal feeding purposes. Eight (8) trials were established in Camp-Perrin and Déron. Seed related problems prevented the establishment of the Marigot trial in the Southeast Department.

The following forage species were placed under observation in the sites:

□ GRASSES (8)

- Panicum MAXIMUM, CIAT 16031
- Panicum MAXIMUM, CIAT 16028
- Panicum MAXIMUM, CIAT 16051
- Brachiaria DICTYONEURA, CIAT 6133
- Brachiaria BRIZANTHA, CIAT 26110
- Brachiaria HUMIDICOLA, CIAT 679
- Brachiaria HUMIDICOLA, CIAT 26427
- Brachiaria DECUMBENS, CIAT 606

□ HERBACEOUS LEGUMES (8)

- Arachis PINTOI, CIAT 18744
- Arachis PINTOI, CIAT 22160
- Desmodium OVALIFOLIUM, CIAT 33058
- Centrosema PUBESCENS, CIAT 15160
- Centrosema MACROCARPUM, CIAT 25222
- Stylosanthes GUIANENSIS, CIAT 11844
- Clitoria TERNATEA
- Neonotonia WIGHTII, CIAT 204

□ SHRUB LEGUMES (8)

- Cratylia ARGENTEA, CIAT 18516
- Flemingia MACROPHYLLA, CIAT 17403
- Leucaena MACROPHYLLA (Subsp NELSONII) , OFI 47/85
- Leucaena LEUCOCEPHALA
- Leucaena LEUCOCEPHALA (Subsp GLAGRATA, c.v Tarramba), OFS 34/92
- Leucaena COLLINSII, OFS 52/88
- Calliandra CALOTHYRSUS, CIAT 22310
- Calliandra CALOTHYRSUS, CIAT 22316

□ **COVER LEGUMES (4)**

- *Pueraria phaseoloides*, CIAT 7182 (Kudzu)
- *Canavalia brasiliensis*, CIAT 715
- *Vigna radiata* (Caupi)
- *Mucuna pruriens*, CIAT 9349

The Grasses, herbaceous legumes, and shrub legumes trials were sown on plots 3x5 m², whereas cover legumes were sown on plots of 5x5 m².

Heavy rainfalls experienced on the days of sowing significantly reduced the germination percentage for the species listed below:

Group	Species	Germination %
Cover legumes	<i>Vigna radiata</i>	50
	<i>Brachiaria dictyoneura</i> 6133	50
Grasses	<i>Brachiaria humidicola</i> 679	50
	<i>Brachiaria humidicola</i> 26427	50
	<i>Stylosanthes guianensis</i> 11844	22
Herbaceous Legumes	<i>Neonotonia wightii</i>	22
	<i>Desmodium ovalifolium</i>	23
	<i>Leucaena macrophylla</i> , 47 / 85	24
Shrub Legumes	<i>Leucaena leucocephala</i> 17263	24
	<i>Leucaena leucocephala</i> , 34 / 92	50
	<i>Leucaena collinsii</i> , OFS 52 / 88	35
	<i>Flemingia macrophylla</i> 17403	25

Re-sowing of some species was done on September 15, 2000 with extra seeds that had been conserved in refrigeration facilities. Such activities did not produce the expected outcomes because the population of all the species considered remained pretty low except for the Viagna (CAUPI). It must also be underlined that heavy rainfalls were experienced during the period that followed re-sowing operations. This probably caused the low levels of sprouting reported once again in the plots.

The Déron trial was sown on September 7 and 8, 2000. The ORE staff, as inspired with the experience of bad germination level experienced in the Camp-Perrin trial, and apprehending the eventual bad quality of the seeds, thought it could remedy this situation by increasing the quantity of seeds per package at the sowing period. Thus, they used part of the seeds intended for the Marigot trial to establish the Deron trial.

3.- Results obtained for the different crops

The scope of yields achieved is function of the time allotted for the implementation of the vegetative cycle activities for each crop considered. For instance, yields are more conclusive for Beans, of which cycle lasts 80 to 90 days, than for Cassava, which generally requires more than 8 months to complete its farming cycle.

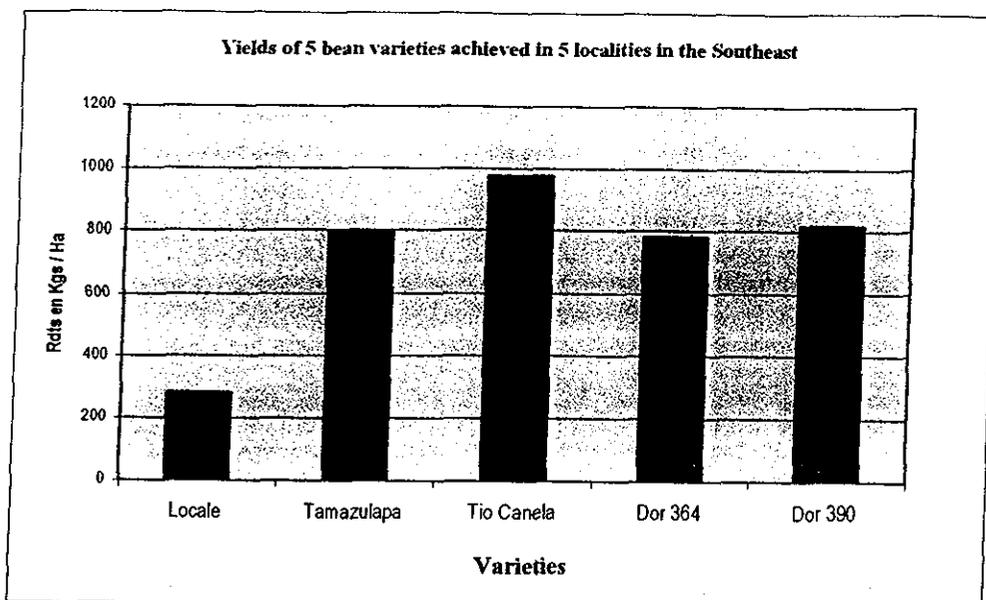
3.1.- Beans. Through the trials conducted during the project implementation, numerous materials were tested in the field as mentioned in the previous chapter. Despite the short life of the Project, two interesting varieties were selected: a red one, the TIO CANELA, and a black one known as BAT 304 or BRUNCA. In addition, other materials, extremely promising, were identified. Additional multi local trials shall be established for them.

The yields achieved during the first cycle of trials conducted in hillside areas in the Southeast Department are summarized in the following table:

<i>Site</i>	<i>Variety</i>	<i># of plants harvested / 4 m²</i>	<i># of pods harvested / 4 m²</i>	<i>Kg / Ha</i>
A	Dor 364	81	368	606
	Dor 390	64	410	710
	Tio Canela 75	85	510	764
	Tamazulapa	84	515	970
	Local	60	126	205
<i>Average site A</i>		74.8	385.8	580
B	Dor 364	52	427	1145
	Dor 390	62	354	619
	Tio Canela 75	88	636	1243
	Tamazulapa	64	343	670
	Local	63	241	359
<i>Average site B</i>		65.8	400	807
C	Dor 364	52	246	595
	Dor 390	51	417	1119
	Tio Canela 75	57	407	928
	Tamazulapa	50	288	751
	Local	-	-	-
<i>Average site C</i>		52.5	399.5	848
<i>Average of the 3 sites</i>		65.8	430	728

Yields of 3 trials established in three sites in Fonds Jean-Noel, and Cap-Rouge, in the Southeast Department

The following histogram enables us to better appraise the performance of the varieties tested within these trials.

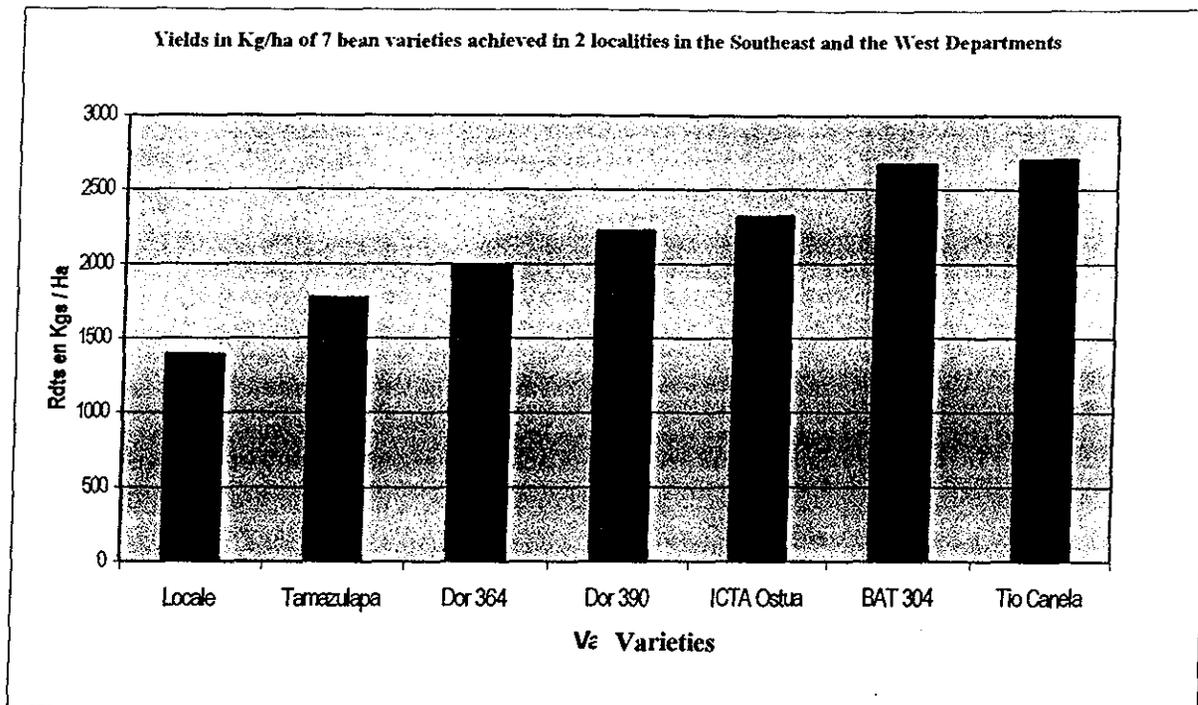


On the other hand, during the December farming season, the BAT 304 (BRUNCA) variety, which showed high performance in the "Nursery trials" conducted in both hillside and flat areas, was introduced in the Southeast Department and in Petit-Goâve trials. The achievements are summarized in the following table:

Site	Variety	# of plants harvested / 4 m ²	# of harvested / 4 m ²	Yields in Kg / Ha
A	Dor 364	104	503	1521
	Dor 390	87	924	1968
	BAT 304	104	730	2033
	Tio Canela 75	102	1026	2500
	ICTA Ostua	113	939	2268
	Tamazulapa	94	634	1363
	Local	-	-	1386
Average site A		101	793	1863
B	Dor 364	110	751	2459
	Dor 390	108	850	2470
	BAT 304	123	1077	3303
	Tio Canela 75	112	1120	2903
	ICTA Ostua	133	896	2365
	Tamazulapa	105	943	2170
	Local	-	-	-
Average site B		115	940	2612
Average of the 2 sites		108	956	2238

Yields achieved in two sites in Savane Dubois (Southeast) and Petit-Goâve.

The following graphic allows us to better appraise the yields achieved by these varieties:

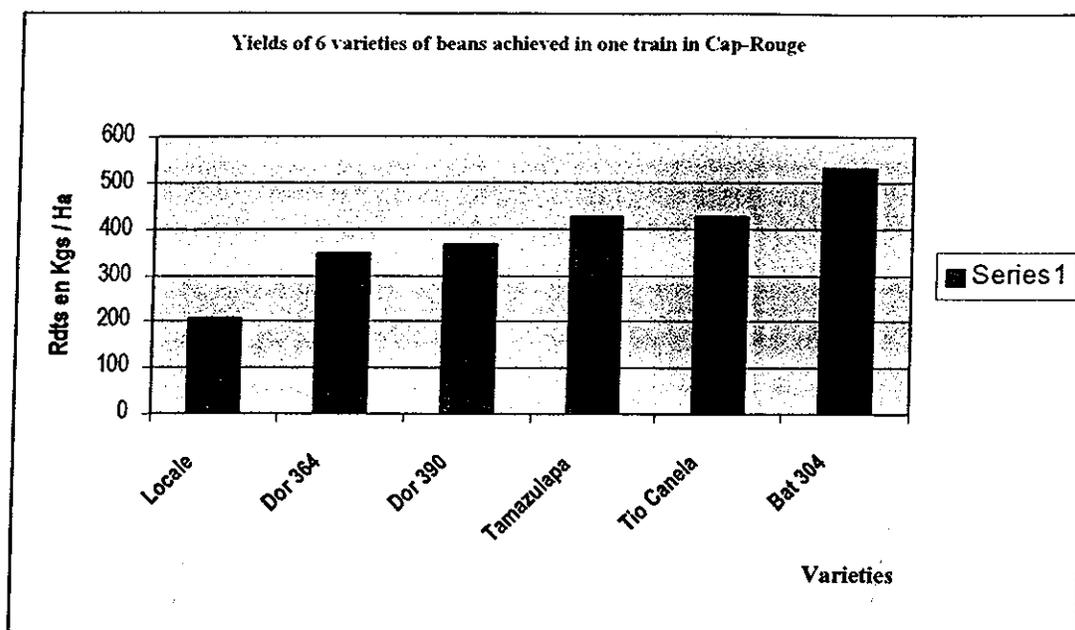


The yields achieved during the last cycle of trials conducted under very unfavorable weather conditions in hillside areas in the Southeast Department are summarized in the following table and histogram.

VARIETIES	YIELDS (KILOGRAMS PER HA)
<i>DOR 390</i>	367,2
<i>DOR 364</i>	347,2
<i>BAT 304</i>	530,9
<i>TAMAZULAPA</i>	424,0
<i>TIO CANELA</i>	428,0
<i>LOCAL</i>	250,4
<i>Average of the trial</i>	391,3

Yields in kg / Ha achieved in one plot of trials in hillside areas in Cap-Rouge, in the Southeast Department.

The following table allows us to better appraise the yields of the varieties.



3.2.- Cassava. We have not yet received any information concerning the identification of materials with high performance level in the trials that were established, since the evaluation of these trials has not been completed yet. It has been observed that the CMC-40 variety, introduced in the country more than 15 years ago and used as a witness in the trials, seems to show a relative high performance in terms of vegetative development compared to newly introduced improved varieties.

3.3.- Maize. Nine (9) Maize trials were conducted during the project implementation: 6 in Camp-Perrin, 2 in Deron, 1 in Marigot in the Southeast, and 1 in Damien. It must be underlined that because of unfavorable weather conditions that prevailed in Déron and Damien, the trials established were disqualified. The analysis of the overall achievements allowed the selection of some materials such as three (3) Hybrids and one variety with open pollination that proved to be promising under the evaluation conditions. They can be further evaluated in the context of other cycles of multi local trials. Such materials are identified with the following code names:

Type of material	Code
<i>Hybrids</i>	CML-172 x CML-161 CML-2206 x CML-421 CML-172 x CML-6601 x CML-161
<i>APO Variety</i>	W LPFY (RRSYB)

3.4.- Forages. In the evaluation of forage we measured: height, soil cover, and estimation of the level of dry matter produced during rainy and dry seasons. Forage related data were collected in collaboration with the staff of the ORE Organization based in Camp-Perrin.

Based on the evaluation conducted in December 2000, the Grasses represents the group that shows the best adaptation level. Two (2) *BRACHIARIA* species (*brizantha* and *decumbens*) and three (3) *PANICUM* showed a very good development, with an average height of 40 centimeters on the date of the evaluation. It must be noted that in Déron, the *PANICUM* 1628 is not developing well. In both sites, the other *BRACHIARIA* (*Humidicola* and *Dyctioneura*) shows mediocre development with low soil cover. It must be underlined that because of the extensively diversified development of the species within the same trial, pruning processes were significantly delayed.

The yields of height measurements and estimation of dry matter performed on the graminea at the end of May and August, corresponding respectively to the rainy and dry periods, are summarized in the following table:

Type	Specie	Code	End of May 01		En of August 01	
			Height (cm)	% DM	Height (cm)	% DM
<i>Panicum</i>	<i>maximum</i>	16031	67	41	49	38
<i>Panicum</i>	<i>maximum</i>	16028	66	42	43	39
<i>Panicum</i>	<i>maximum</i>	16051	67	38	36	38
<i>Brachiaria</i>	<i>dictyoneura</i>	6133	59	34	39	35
<i>Brachiaria</i>	<i>brizantha</i>	26110	71	43	59	38
<i>Brachiaria</i>	<i>humidicola</i>	679	35	36	33	35
<i>Brachiaria</i>	<i>humidicola</i>	26427	34	34	25	42
<i>Brachiaria</i>	<i>decumbens</i>	606	63	45	50	40

Heights and % of dry matter of 8 species of Graminea (Camp-Perrin)
DM: Dry Matter

All the species of cover crops show very good development, except for *KUDZU* (*Pueraria phaseolides*) which remains unproductive despite a population ranging around 78%, with a percentage of soil cover not exceeding 40%, whereas in December 2000, the other varieties experienced levels of soil cover ranging around 100%. It must be noted that the *CAUPI* and the *CANAVALIA* varieties have been very aggressive. The *CAUPI* had already started producing pods, and seed will be harvested progressively. The *MUCUNA*, is very invading and covers almost 50% of the surrounding plots. Consequently, it is quite difficult to manage this trial. Data collected during the same periods are presented in the following table:

Type	Specie	Code	End of May 01			End of August 01		
			% of cover	Height (cm)	% of DM	% of cover	Haut. (cm)	% of DM
<i>Canavalia</i>	<i>brasiliensis</i>	715	51	56	28	11	55	30
<i>Mucuna</i>	<i>Pruriens</i>	9349	20	42	22	19	55	24
<i>Pueraria</i>	<i>phaseoloides</i>	7182	33	25	25	12	25	36
<i>Vigna</i>	<i>Radiata</i>	-	the Vigna experienced quite a bad development					

Heights, % of cover and dry matter of 8 Graminea species (Camp-Perrin)
DM: Dry Matter

Among the shrub legumes, the species that experienced a relatively acceptable development were *Leucaena leucocephala*, *Calliandra* and *Cratylia*, which has been developing slowly. The *L. macrophylla* and *L. colinsii* remain the most mediocre with a development that is still inferior to 20 centimeters and with populations ranging around 10 to 20 % despite several re-sowing operations.

An evaluation conducted in Camp-Perrin and Déron in July 2001 enabled us to collect the following data:

Type	Specie	Code	Camp-Perrin			Déron		
			# of new buds	Height (cm)	% of DM	# of new buds	Height (cm)	% of DM
<i>Cratylia</i>	<i>Argentea</i>	18511		dnm	50			
<i>Flemingia</i>	<i>macrophylla</i>	17403		dnm	51			
<i>Leucaena</i>	<i>macrophylla</i>	47		153	63			
<i>Leucaena</i>	<i>leucocephala</i>	17263		164	51		130	49
<i>Calliandra</i>	<i>callothyrsus</i>	22310		95	69		110	62
<i>Calliandra</i>	<i>callothyrsus</i>	28316		88	71		134	55
<i>Leucaena</i>	<i>collinsii</i>	52/88		116	64		dnm	dnm
<i>Leucaena</i>	<i>leucocephala</i>	34/92		153	61		dnm	dnm

Heights, % of cover and dry matter of 8 shrub leguminous (Camp-Perrin and Déron)
Dnm = Data not measurable
DM: Dry Matter

The best three (3) species of the herbaceous legumes are *Clitoria*, and the two *Centrosema*. The most mediocre remain the *Stylosanthes*, the *Desmodium*, and the *Neonotonia* with low populations, despite the re-sowing operations performed. It must be noted that the *Arachis* ranges at an intermediary level, keeping populations ranging around 65%, and the 18744 has more abundant flowers than the 22160. The difference in Déron is that the *Stylosanthes* is developing very well, whereas the *Centrosema* shows a less interesting development in this hillside area than in Camp-Perrin.

The following table gives more details about the evaluations conducted in both Camp-Perrin and Déron at the end of May 2001.

Type	Specie	Code	Camp-Perrin			Déron		
			% of cover	Height	% DM	% of cover	height (cm)	% DM
<i>Arachis</i>	<i>pintoi</i>	18744	21	5	35	4.5	4	37
<i>Arachis</i>	<i>pintoi</i>	22160	30	6	30	6	5	35
<i>Desmodium</i>	<i>ovalifolium</i>	33058	-	-	-	6	5	<i>Dnm</i>
<i>Centrosema</i>	<i>pubescens</i>	15160	90	36	36	3.5	10	38
<i>Centrosema</i>	<i>macrocarpum</i>	25222	56	51	37	7	26	31
<i>Stylosanthes</i>	<i>guianensis</i>	11844	-	-	-	11	26	35
<i>Clitoria</i>	<i>ternatea</i>	-	18	36	41	-	-	28
<i>Neonotonia</i>	<i>wightii</i>	204	-	-	-	-	-	-

heights % of cover and dry matter of 8herbacee species (Camp-Perrin and Déron)
Dnm = Data not measurable
 DM: Dry Matter

4.- Seeds multiplication

This activity is extremely important to the HGRP program. Indeed, the final goal of the research activities is the availability of seeds to the farmers in the intervention areas. Such seeds would be chosen among the ones that showed a high performance and are adapted to the local conditions. Thus, at the end of the program, basic seeds of all the varieties deemed interesting are being multiplied in view of the production of commercial seeds to be used by the farmers. This is particularly the case for Bean, Maize, and Tropical Forages.

4.1.- Bean

Starting in December 2000, 500 Kilograms of basic seeds of the black BAT 304 variety were provided, with the help of Ing. Rodolfo Araya in Costa Rica, to the program and are multiplied by the ORE Organization in Camp-Perrin. Currently, about 1.5 tons of certified seeds of this variety are available in Camp-Perrin. On the other hand, more than 200 Kilograms of basic seeds of the same variety have been sown in view of the production of at least 3 tons of certified seeds, which will be available shortly.

In other respect, another red grain variety known as TIO CANELA had also been identified and 340 Kilograms of basic seeds of this variety were sent to Haiti from Columbia to be used for the benefit of the farmers. As for the BAT 304 variety, commercial seeds will be produced and made available to the farmers in the areas served by the program.

Another variety, DOR 500, also proved to be interesting. The project produces 40 Kilograms of basic seeds of this variety, which will be used for the establishment of pre-validation plots in rural areas, in order to confirm its performance under the working conditions of Haitian farmers.

4.2.- Maize

As mentioned in paragraph 3.3 of this report, seven (7) trials were conducted successfully in Camp-Perrin and Marigot, in the Southeast Department. The yields are summarized in attachments 1, 2, 3, 4, 5, 6, and 7. The varieties and Hybrids selected are currently undergoing basic seed multiplication, which will be made available to the Program in the course of this month. A total of one hundred (100) Kilograms of basic seeds will soon be ready to be used to produce commercial seeds for the benefit of the farmers targeted by the HGRP program. These varieties and Hybrids are known under the following codes:

- **Variety:** WLPFY (RRSYB)
- **Hybrids:** CML-172 x CML-161
CML-2206 x CML-421
CML-172 x CML-6601 x CML-161

4.3.- Tropical forage

An estimated 339 Kilograms of seeds of tropical forage species deemed interesting are already available in Haiti for the program purpose. The following table gives more details about them.

<u>Specie</u>	<u># Ciat</u>	<u>Lot</u>	<u>Weight (Kg)</u>
Mucuna pruries		M01/01	100.0
Panicum maximum	Mombaza	101/01	60.0
P. maximum (Tanzania)	16031	221/00	60.0
B. decumbens (Basilisk)	606	10/01	50.0
B. brizantha (Toledo)	26110	ATE31700	10.0
Canavalia ensiformis			30.0
Centrosema macrocarpum	5713	SI02990	20.0
C. pubescens	15160	A137000	5.0
Cratylia argentea	18516/18668	ATE32001	1.0
C. argentea	22374	A140601	0.1
C. argentea	22386	A139601	0.1
C. argentea	22379	A132899	0.1
C. argentea	22382	A133399	0.1
Arachis pintoii	22160	99-017	1.0
P. atratum	26986	12464	1.0
Stylosanthes guianensis	184	95099	0.5
Leucaena macrophylla	OFI 47/85	A136900	0.2

4.4.- Cassava

Through the trials, the project has not been able to determine, in a definitive manner, a variety of cassava compared to the local vegetal agricultural varieties, since the duration of the project did not allow it. The CMC-40, which was introduced for several decades, seems to be losing some of its productive capacities. Thus, the CIAT-HGRP project is introducing original bud materials in the form of vitro-small plants. The organization called « *Opération Double Harvest* » is in charge of assuring the acclimatization of the vitro-small plants introduced.

As well, the buds from Columbia with the highest performance, that could not be introduced because of the viral illness called « FROG SKIN », are also being introduced and acclimatized to Double Harvest. These materials are known under the following code names:

Clones	# of small vitro-plants
<i>BRA 383</i>	15
<i>CM 6740 - 7</i>	15
<i>CM 7514 - 7</i>	10
<i>CM 7951 - 5</i>	10
<i>PER 183</i>	15
<i>SM 909 - 25</i>	15
<i>CM 3306 - 4</i>	15
<i>CM 4843 - 1</i>	15
<i>CM 6754 - 8</i>	10
<i>SM 805 - 15</i>	15
<i>TAI 8</i>	15
<i>CM 507 - 37</i>	15
<i>CM 523 - 7</i>	15
<i>CM 4574 - 7</i>	15
<i>CM 5306 - 8</i>	15
<i>CM 6438 - 14</i>	15
<i>CM 6921 - 3</i>	15
<i>CM 7073 - 7</i>	15

5.- Training

Training was a major component of the Project. Two (2) types were adopted: one for the senior staff of the HGRP, in the form of scientific visits to the CIAT bureaus in CALI and COSTA-RICA, and another one organized locally for the benefit of public and private partners and other entities likely to become partners of the project in the future.

The following table gives an overview of the training provided in the context of scientific visits.

Staff persons	Institution	Place	Date	Crops
<i>Levael Eugene</i>	CIAT	Cali	April 2 – 15 / 00	Beans, Cassava
<i>Eliassaint Magloire</i>	ORE	Cali	April 2 – 15 / 00	Beans Cassava
<i>Pricien Andréfaine</i>	ORE	Costa-Rica and Cali	July 00	Forage and Cassava
<i>Levael Eugene</i>	CIAT	Cali	May 16 - 26 / 01	Beans, Cassava
<i>Eliassaint Magloire</i>	ORE	Cali	May 16 - 26 / 01	Beans, Cassava
<i>Monique Finnigan</i>	ORE	Costa-Rica and Cali	May 16 - 26 / 01	Beans, Cassava

In other respect, CIAT plays a key role in training the staff working within institutions or national programs in some countries throughout Central America and the Caribbean. Under this project, training focused on Senior Staff (Engineer-Agronomists) working with partner Institutions of the HGRP Program and other Entities with potential collaboration possibilities with CIAT.

This nationwide course brought together senior staff from several geographic departments of the country. It was held at the American University of the Caribbean (AUC) in Cayes, from June 17 to June 29 inclusively. The opening ceremony was particularly heightened by the presence of the following personalities:

- Mr. Luke Lewis, Director of USAID, which is the funding Institution of the Program
- Mr. Daniel O'Neil, Director of the HGRP Program in Haiti.
- Mr. Aart Van Schoonhoven, one of the CIAT Directors, based in Columbia
- Mr. Guillermo Galvez, General Coordinator of the CIAT / HGRP Project
- Mr. Jean-Yves Banatte, Representative of the Ministry of Agriculture.
- Mr. Alfredo Caldas, CIAT Training Officer

Attachment 8 lists the persons who participated in this training event.

Beans, Cassava, Plantain, Maize, and tropical forage crops were addressed during the interventions both in the classrooms and during practice sessions conducted in the field. It must be underlined that an entire day was dedicated to an intervention on improved seed production.

The majority of the trainers who gave the training on the different crops were technicians from CIAT. They came to Haiti especially for that purpose. The following table highlights the crops addressed during the training sessions and the trainers who made the presentations for each of them.

Crops	Trainers	Presentation dates	Trainers' provenance
Bean	Henry TERAN and Carlos JARA	June 18 and 19	CIAT, Cali, Columbia
Cassava	Fernando CALLE and Luis CADAVID	June 25 and 26	CIAT, Cali, Columbia
Maize	Salvador CASTELLANOS	June 27	CIMMYT, Guatemala
Plantain	Silvio BELALCAZAR	June 22 and 23	CORPOICA (Instituto colombiano agropecuario), Columbia
Tropical forage	Pedro ARGEL Luis FRANCO and Luis Hernandez	June 20 and 21	CIAT, Costa-Rica and Cali, Columbia
Improved seeds	Eliassaint MAGLOIRE and Rousseau LAPLANTE	June 28	ORE, Camp-Perrin

Conclusion

The implementation of this Project by CIAT facilitated a better understanding of the main constraints in which Haitian producers are making decisions and the complexity of their agricultural farm. Improved seeds are only one element of the problem. Considering the overall agricultural problematic is essential to improve impacts and guarantee their sustainability in the area of agricultural production and natural resource conservation.

For all the crops on which the Project has worked, varieties with high performance have been more or less identified and paths have been cleared; basic seeds of Bean and Maize were produced and made available to the program. Also, seeds of several promising forage species are ready to be used for the benefit of local producers. The situation is the same for Cassava of which buds with high performance will be arriving from Columbia in the form of vitro-small plants. They will be multiplied and tested throughout the country. The main problem is the management of these materials as the program is phasing out.

Part of these materials will be used to conduct multi local trials, especially for species necessitating other research cycles in rural areas. The involvement of CIAT in the implementation of the HAP (Hillside Agriculture Program) will considerably facilitate this activity in the intervention areas.