



**CIMMYT  
CENTRAL AMERICAN / CARIBE  
REGIONAL MAIZE PROGRAM**

# **1988 MID YEAR PROGRESS REPORT**

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**GUATEMALA, AGOSTO 1988**

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## INTRODUCTION

According to the priorities established in the work plan of 1988-1989, CIMMYT staff based in Guatemala spent 18 weeks traveling in El Salvador, Honduras, Nicaragua, Haiti, Panama, Costa Rica, Republica Dominicana, and Cuba on consulting trips. The remaining 8 weeks were devoted to activities related with Guatemala National Programs, Experimental Stations, Farmer Production, and Seed Production. Consulting activities were important during this time period since most of the countries planting seasons begin in May. Various workshops were held at the end of 1987 while results and planning meetings for 1988 were conducted in every country during January and February.

An important annual meeting of the "Coordinators for Central America/Caribbean", was held in Guatemala from May 4-8 (see proceedings of the committee CEP) and an executive review committee was formed.

## I. GERMPLASM DEVELOPMENT AND IMPROVEMENT

### 1.0 Individual Country Projects

#### 1.0 GUATEMALA

This National program invests 50% of their economic and human resources in hybrid development. New hybrids tested across 15 locations outyielded HB-83 by 20% (nonconventional hybrid released in 1983) while also having superior agronomic traits such as less ear rot, improved husk cover and standability. This year, 10 new yellow and white hybrids are being tested at 40 locations in farmer fields across tropical lowland megaenvironments (V-1000 SNN). In addition 50 verification-demonstration plots have been established with the new hybrids HB-85 (white) and HA-46 (yellow) in the tropical lowland coast (0-1000 masl).

In the highland (Quetzaltenango, Altiplano Occidental) a new outstanding prolific cultivar based on local germplasm has been identified and a new population (ICTA-CANTEL) has been formed with the addition of prolific families selected from ICTA Chivarreto. This material was highly consistent in prolificacy as the 1987 evaluation showed more than 1.7 ears/plant.

The newly formed population is undergoing improvement for maintaining prolificacy, increasing yield, decreasing plant and ear height and standability through the FSRR selection scheme. Full sib crosses and selfs were made during the first cycle of selection in July, 1988.

A renewed interest in early maize cultivars is taking place in the central highland (Chimaltenango province) for double cropping with vegetables. The goal of this effort is to increase the efficiency of land by double cropping and/or relay cropping in the central highlands of Guatemala and Honduras. Emphasis will be given to CHANIN and DON MARSHALL maize populations which are harvested 90 days earlier than the local full season varieties. Also, an alternate S1, S2-half sib selection scheme has started using San Jeronimo in the winter nursery.

The PROGETTAPS project (proyecto de Generacion y Trnasferencia de Tecnologia) which is coordinated with DIGESA and ICTA is being very effective in transferring ICTA technology in marginal areas (mainly varieties). Much of this technology generated by ICTA from 1979 to 1984 is being adopted by farmers in the regions where this effort is taking place.

#### 1.2 EL SALVADOR

Hybrid development constituted 90% of the El Salvador National Maize Program effort. Ten regional trial evaluations are being

implemented at 10 locations in four regions involving 25 three way double crosses, white and yellow hybrids.

Preliminary yield tests involved more than 200 new single, three way and double cross combinations for biotic and abiotic stress screening (drought and stunt). From May to June 1988, 100 demonstration plots were seeded with a new hybrid HE-53 (Stunt Resistant) across the country. The advantages of this new cultivar over the old H-5 hybrid include decreased height, good storage (semiflint), earlier maturity and increased yield under less favorable environments (stunt).

Forty demonstration plots of CENTA PASAQINA which is a drought resistant (O.P.V.) cultivar were planted in the eastern provinces (Sn. Miguel, Usulután, Gotera).

### 1.3 HONDURAS

Hybrids developed by the Honduras National Program (H-29) outyielded almost every other hybrid tested (including Dekalb and Pioneer entries) in the PCCMCA trial planted at 12 locations in CA/C in 1987.

This year, verification trials have been planted in all important maize growing regions.

Varieties derived from population 43 are the most important maize cultivars distributed among Honduras farmers. A substantial amount of time is devoted to develop germplasm resistant to stalk and ear rot. The first cycle of improvement through S1 recurrent selection in population Guayape B-102 was completed in 1987. In the first half of 1988, recombination of the superior 8 S1 families were made and bulk seed to produce a synthetic F2 will be produced in the second half of 1988.

### 1.4 NICARAGUA

Modern technology (Central Pivot irrigation systems) has created a tremendous problem for maize production. More than 12,000 Ha. belong to "Empresas Agrícolas del Estado" devoted to maize production and are suffering from stunt diseases.

Two factors have contributed to the problem mentioned above.

1. No consistent planting dates have been established, therefore allowing *Dalbulus* spp. and the subsequent stunt inoculum to be present at all times throughout the year. This is primarily a function of the center pivot systems used which allow planting to take place virtually any month of the year.

2. Politicians believe that only hybrids should be used under modern technology and irrigation. The highly susceptible hybrids from Pioneer and Dekalb were planted under what they

called "Plan de Contingencia".

#### SOLUTIONS:

1. New directors of agriculture are now listening to scientists (Roger Urbina, Hugo Cordova, William Raun) who are encouraging the restricted planting of maize during the month of March when populations of *Dalbulus* spp. are low. Experiments conducted in 1986 and 1987 show a tendency to improve both yield and disease levels as a function of planting date. (See Reunion Annual de Coordinadores de CA/Caribe, May 1-4 1988)
2. There should be no more importation of susceptible hybrids since NB-6 (Santa Rosa 8073) is a tolerant variety developed by the previous collaborative stunt project lead by C. de Leon (1974-1980). This line, planted mostly under rainfed conditions has shown dramatic improvement over the previously mentioned imported hybrids. In 1988 more than 50,000 Ha. were seeded to NB-6.
3. S1 recurrent selection in populations NB-12 (Santa Rosa 8576) has increased stunt resistance, grain yield and improved agronomic traits. This material was planted in August to form S1 lines, and a synthetic-1 was advanced to F-2. NB-12 is also showing a more stable resistance versus the NB-6 hybrid and projects to produce a male sterile stunt resistant hybrid have started.

Superior hybrids from Dr. Vasal's hybrid program are being tested in regional trials mostly under rainfed conditions. TWC-28 is performing well across in the tropical lowland.

#### 1.5 COSTA RICA

OVP varieties produced up until 1985 are no longer being accepted by farmers as they are very susceptible to ear rot (mainly in the coastal Atlantic areas where maize is grown under more than 4000 mm of rain).

From 1981 to 1985, the national Maize Program coordinated amongst the University of Costa Rica and MAG worked for improved germplasm development and resistance to ear rot, however, the progress during that time was minimal.

In my first visit to Costa Rica, April 1986, we reoriented the program to form a collaborative research project to oversee these limiting factors. (see collaborative research projects).

In 1987 four sets of hybrids from Dr. Vasal were planted in Costa Rica at Los Diamantes (Atlantic Coastal lowland) EJA (Pacific Coastal Lowland and Alajuela, Central Zone)

The superior five hybrids were selected and a uniform trial was prepared including a check from Pioneer and Dekalb.

This year, 10 regional hybrid trials are being tested under farmer conditions. A complete project has been prepared by a committee formed by Consejo Nacional de Produccion, UCR, MAG, and Oficina Nacional de Semillas.

## 1.6 PANAMA

Panama annually invests US\$ 600,000 in hybrid seed corn.

The total area planted to maize in Panama is 70,000 ha. ( 20,000 ha are planted using hybrid seed mainly from Pioneer (X-304C) which is a single cross hybrid combination.)

Based on these circumstances, a hybrid project was established 1986 in order to develop hybrids for Panama in collaboration with the CIMMYT hybrid program.

Primary evaluation in 1986 showed that superior single crosses from the Vasal program outyielded 304C by more than 15%.

Based on this information, predicted TW and DC crosses were tested in 1987 at 10 locations. In addition, TW03 and DC03 trials were planted at two added locations in Panama. The outstanding hybrids DC75 and TWC89 y 96 outyielded X304C by more than 15% and had superior agronomic traits such as husk cover and ear rot. In 1988, plans were made to plant 20 yield trials in farmer fields while at the same time verification plots for zero tillage are being established.

The seed production isolation plots of the superior hybrid TW and DC crosses were planted at Via de Los Santos Experimental Station in Chitre, 300 miles west of the city of Panama. Most of the lines involved in the formation of these TW and DC crosses are showing excellent vigor and uniformity (S3 level of inbreeding).

Double cross hybrid production isolations planted at Rio Hato Experimental Station are showing good hybrid vigor at this time and the two single crosses are performing quite well as nicking is not expected to be a problem.

It is expected that we will have enough seed for planting the hybrid trials and verification plots in the Chitre and Chiquiri province of Panama where most of the 20,000 ha. of maize cultivation is mechanized.

At the Rio Hato Station we harvested 8 inbreed lines that were involved in the superior TW and double crosses hybrids. Fortunately, the elite inbreeds (most common in the superior hybrids found) are used as the male in the parent single crosses which are uniform and high yielding (inbreed performance is expected to guarantee the reproduction of a superior hybrid).

## 1.7 HAITI

Since the production of La Maquina 7827 and La Maquina 7829 in 1983, no efforts in evaluations of new maize cultivars have been made.

In 1988, evaluation of Across 8326, Ferke 8325, Suwan 8331, Suwan 1 and Pool 17 is being conducted at various locations across the country.

#### 1.8 REPUBLICA DOMINICANA

Maize breeding efforts are considered mainly for the improvement of resistance to stunt. (see collaborative research projects)

Population CENIA 12 (Local Frances) has shown consistent variability for selecting for resistance to this important trait. (also, reduced plant and ear height, drought and lodging resistance).

This year the evaluation of 400 S1 lines which comprise the second cycle of selection have been planted at CESDA San Cristobal and San Juan de la Magua.

#### 1.9 CUBA

In the past, CIMMYT's contribution to Cuba's Maize National Program has been realized through visits from headquarter staff (one or two visits per year by Dr. Alex Ortega and Dr. Willy Villena). This collaboration has resulted in the production of three varieties Across 7931, Across 7926 and Poza Rica 7928. Alex and Willy also participated with the in country training activities.

In addition, Cuban scientists have gone to Mexico for formal training and other visiting scientist programs. This past collaboration is highly appreciated by maize scientists and Cuban officials at the Ministry of Agriculture.

Relationships among CIMMYT Maize CA/C and NARS is being strengthened via a new organization of NARS to collaborate among themselves to solve the most important limiting constraints via collaborative research in Breeding and Agronomy.

Cuba is now a member of this CRP (Comision Regional Permanente) and will participate in the future. They will also be involved in the stunt project.

The regional program will provide a PC Turbo (IBM clone) to undertake the problems of data collection and statistical analysis. Cuba will be the ninth country in our computer network organized by the regional program.

A seed training course will be delivered in November 1988. W. Raun traveled to Cuba in August to provide the necessary training for operation of the PC computer we purchased and followed up on



the training activities in software that we established in Central America.

In the future, Bill will also work with them on planning of Agronomic field trials.

## 2.0 HORIZONTAL COLLABORATION

### 2.1 DEVELOPMENT AND IMPROVEMENT OF GERMOPLASM RESISTANT TO STUNT

Horizontal collaboration has been one of the most exciting accomplishments in germplasm development in the CIMMYT CA/A regional program. NARS collaborate among themselves with the orientation and coordination of CIMMYT regional staff. One of the most rewarding joint CIMMYT/NARS efforts to date is the stunt resistance breeding project which involves the sharing of responsibilities among the Dominican Republic, El Salvador and Nicaragua. More than 100,000 ha of maize are planted to Santa Rosa 8073, a stunt-resistant variety out of the CIMMYT coordinated project.

#### 2.1.1 POPULATION 73 AND 22

Evaluation for yield of 400 S1 lines originated from the second cycle of S1 recurrent selections and were tested at San Andres El Salvador January to April 1988. Stunt evaluation for the same S1 set will be carried out in SCP, EL Salvador and Santa Rosa in Nicaragua in the second half 1988.

Progress in the collaboration project was reported in April at the PCCMCA Meetings and from the Maize Coordinator meetings from Central America and Caribe held in Guatemala from May 1-4, 1988.

#### 2.1.2 POPULATION 28 AND 36

Recombination of the superior fraction (40 S1) full sib formation and the synthetic-2 as well, were made at San Cristobal, Republica Dominicana from April to June 1988. Full sibs among superior S1 lines were planted to initiate the formation S1 third cycle S1 recurrent selection.

### 2.2 DEVELOPMENT OF GERMOPLASM ADAPTED TO LIMITED MOISTURE CONDITIONS

Materials are evaluated in farmers fields to obtain adaptation and stability through the accumulation of favorable genes which contribute to yield under those circumstances. Those countries collaborating in this effort are those most vulnerable to drought: El Salvador, Guatemala, and Honduras. These national programs share the responsibility to develop material for the drought megaenvironment which consists of over 50,000 ha in the region.

In the first half of 1988, 400 S1 lines are being evaluated in Nueva Guadalupe, El Salvador; Choluteca, Honduras in a replicate trial under rainfed limited moisture conditions (see details in Proceeding of Meeting of Maize Coordinators from Central America and Caribe)

### 2.3 DEVELOPMENT OF MATERIAL TOLERANT TO FIELD DETERIORATION

The tendency of farmers to leave the maize crop in the field for long periods of time under heavy rainfall is prevalent along the Atlantic coast of Honduras, Guatemala, and Costa Rica. This requires the development of germplasm resistant to field deterioration. The CA/C regional program has initiated a collaborative ear rot resistance project with Costa Rica, Honduras and Guatemala to develop materials adapted to those conditions.

In June, 400 S1 lines developed from the second cycle of recurrent selection were planted and are being tested under a replicated trial at Las Acacias, Honduras and Los Diamantes, Costa Rica. Two replications at each location were inoculated with ear and stalk rot.

### 2.4 COLLABORATIVE HYBRID DEVELOPMENT PROJECT.

The projects mentioned above will serve as a source of resistant lines to be used in combination with materials from the CIMMYT headquarters hybrid program to develop three-way and double cross hybrids. These elite inbred's resistant to biotic and abiotic stresses will be top crossed to testers (single crosses already used as females in hybrids seed production) in El Salvador, Guatemala, Honduras Nicaragua and Panama - the main hybrid-producing countries in the region.

In January 1988, top crosses were made among S4 lines selected from elite inbred's derived from lines originated from CIMMYT hybrid program using female parents (single crosses) of hybrids HB-83 from Guatemala, H 27 from Honduras and H-5 from El Salvador as testers.

In June 1988, the above mentioned top crosses were planted and are being evaluated in Guatemala, Honduras, El Salvador, Panama and Dominican Republic.

Two important facts were clear in the first cycle of selection. The variation existent within population 22 was minimal when tested under heavy stunt disease pressure (San Cristobal, Nicaragua). Therefore it is suggested that population 76 be incorporated into this project and that population 22 should be eliminated. The same occurred with population 28 in the Dominican Republic. We are planning to substitute population 79 and eliminate population 28. (stunt)

### 3.0 INTERNATIONAL TESTING ACTIVITIES FROM CIMMYT

During 1988 a high priority has been given to hybrid trials distributed from S.K. Vasal and M. Bjarnason. Therefore IPTT testing is being reduced. EUT'S and ELVT'S were planted mainly in less developed programs-NARS. The following table reflects the distribution of trials from CIMMYT.

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TYPE OF TRIALS	LOCATION/COUNTRY
SCO288	Omonita/Honduras
	SC Porrio/El Salvador
SCO388	Omonita/Honduras
	SC Porrio/El Salvador
STC 11	Cuyuta/Guatemala
STC 12	Cuyuta/Guatemala
STC 13	Cuyuta/Guatemala
STC 14	Cuyuta/Guatemala
DIAL QPM-1	Las Acacias/Honduras
DIAL QPM-2	Alajuela/Costa Rica
DIAL QPM-3	SC Porrio/El Salvador
DIAL QPM-4	Cuyuta/Guatemala
DIAL QPM-5	Cuyuta/Guatemala
DIAL QPM-9	La Maquina/Guatemala
IPTT-24	San Cristobal/Rep Dominicana
IPTT-27	La Honda/Panama
IPTT-43	Los Diamantes/Costa Rica

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EVT AND ELVT'S IN CA/C REGION 1988

	12	13	14A	14B	15A	15B	16B	18A	19	TOTAL
EL SALVADOR										
HONDURAS	1	3	---	---	2	2	---	---	--	8
GUATEMALA	1	1	---	---	---	---	---	---	--	2
NICARAGUA	--	--	---	4	---	---	2	---	--	6
COSTA RICA	--	--	1	1	1	1	---	---	--	4
PANAMA*	--	4	6	---	---	1	4D	5	3	23
REP. DOM.	--	3	3	---	---	---	---	---	--	6
CUBA	--	1	1	---	1	---	---	1	--	4
HAITI	--	---	---	---	4	---	4D	4	--	12
BELIZE	--	---	---	---	---	---	1D	1	--	2

\*Main plant season start in August.

## II. SEED PRODUCTION TECHNOLOGY

### 1.0 INDIVIDUAL COUNTRY PROJECTS

#### 1.1 EL SALVADOR

3000 metric tons of hybrid seed was produced in 1986-1987 to be sold in 1988. Hybrids H-3, H-5, H-9 and H-19.

After purification of inbred parents, isolation for seed maintenance and production of the inbred parents of hybrid H-5 were planted at San Andres early in January. At the same time single cross parents were also planted to guarantee excellent quality foundation seed in the region for the next 3 years.

The foundation seed unit has been very active in the increased production of inbred parents of the new hybrid HE-53, and 3Ha of SC S12x1560 (female parent) of hybrid H-5.

Seed maintenance and production isolation plots for CENTA PASAQUINA (recently released) were planted at San Andres by mid June. Ten Ha. of certified seed production of this variety resistant to drought were also planted to guarantee a continued supply of good quality seed.

Seed technology research has been one exciting contribution to strengthening the seed industry. This year, 80% of the seed producers are now planting certified hybrid seed in a ratio of 5:1 female to male.

In 1988 emphasis in STR has been given to seed treaters, different systems of detasseling and evaluation of nutrient application in hybrid seed production areas.

#### 1.2 GUATEMALA

Cultivar improvement projects in hybrid research have permitted the seed industry in Guatemala to grow and strengthen, up a surprising 2000 metric tons.

Significant progress in the foundation seed unit is a clear fact. New inbred parents (6 white and 4 yellow) were increased in isolation in order to provide and guarantee enough excellent genetic and physical pure foundation seed for future increases.

SC production will be made in the second half of 1988. Seed will be provided to seed producers for 1000 Ha. of newly produced hybrids in 1989.

Strong support has been given to the production of certified seed in the highlands and the associated collaboration with the

extension services (DIGESA).

### 1.3 HONDURAS

A very rapid increase in maize seed production is taking over in Honduras. 1100 metric tons were available for the 1988 planting season which represents 40% more than 1987.

The research department took over the responsibility for seed production and maintenance of the inbred parent. The goal for 1988 is to produce 12000 kg of high quality foundation seed for single cross parents of hybrid H-27 and H-29 and OPV.

### 1.4 NICARAGUA

NB-6 (Santa Rosa 8073). 700 Ha. of certified seed were planted in 1988 with a predicted yield of 2.5 tons (Bagged seed). We are expecting to have over 1500 metric tons of seed tolerant to stunt for planting over 90000 Ha. of maize in 1989. Considerable progress is being achieved in seed maintenance and production in OPV, after 1986 when Santa Rosa 8073 was practically lost as genetic or foundation seed.

In the middle of 1986 Roger Urbina and H. Cordova organized a program for the maintenance and production of breeder and foundation seed based on 60 kg. of genetic seed sent by CIMMYT headquarters.

The newly produced NB-12 (Santa Rosa 8576) has been more resistant to stunt than Santa Rosa 8073 and this has been confirmed across various locations in Nicaragua, El Salvador and the Dominican Republic.

### 1.5 COSTA RICA

Yellow corn production has been emphasized in Costa Rica in 1988. Consejo Nacional de la Produccion, MAG, and UCR realized Guarare 8128, and 26 Ha. of certified seed will be harvested by September, 1988.

Seed maintenance and production of Los Diamantes 8043 based corn seed from CIMMYT is starting in the second half in 1988.

### 1.6 PANAMA

One hundred tons of certified Guarare 8128 will be used by farmers in Panama for planting 6000 Ha in early September. After the January Seed Seminar, interest has grown in the private enterprises involved in maize seed production.

Alfonso Alvarado (National Coordinator) is very active in the preparation for releasing his first hybrid in Panama.

A real effort has been made to increase inbred parent an single crosses of DC 89 and TW-76. The goal is to plant 50 Ha. January 1989.

#### 1.7 HAITI

Three tons of foundation seed of La Maguina 7827 were produced in the first half of 1988.

In addition 500 kg. of the varieties Ferke 8326, Suwan 8331 and Pool 17 were produced in the first half of 1988.

#### 1.8 REPUBLICA DOMINICANA

16 tons of CESDA 88 were produced and distributed to farmers in the first half of 1988.

San Cristobal 8328 foundation seed production and maintenance started in March 1988.

#### 1.9 CUBA

Fourteen ha's. of Across 7931 are planted at the Wilfredo Valiente Farm. The importance of an early variety (66 days to Harvest as green corn) for Cuba is based on the fact that 80% of corn is used as green corn, which implies a new alternative for sustaining the demand of this product at any time.

Although, Across 7931 has shown excellent adaptation to this tropical environment, there are some problems that need to be solved in order to be adopted completely by the farmers. The main trait to improve will be husk cover (30% uncovered tips), provided a good condition for Elotero susceptibility is found. However seed production has started in the Experimental Station El Tomeguin, in order to provide enough foundation seed to cover the needs of certified seed for the next planting season. ORB will practice plant selection for uncovered tips during harvest at El Tomeguin, of which 500 ears for the maintaining of the variety will be selected.

Across 7926, Poza Rica 7929 has also been released, and maintenance of the varieties will start next planting season.

We also visited la "Empresa Nacional Productora de Semillas in Santa Clara", 10 ha. of seed production of the female parent of hybrid T-77 (male sterile).

The source of sterility is type "C" in a tropical background resistant to stunt. The stability of the male sterile cytoplasm looks consistent at this location. The maintainer (B) line is also tolerant to stunt (as Marco Torres comment).

They expect to produce 200 tons of seed of T-77 for the next planting season, May 1989. The total seed production of 1988 will be 1,200 tons 75% hybrid 25% varieties including Across 7931 and Across 7926.

## 2.0 HORIZONTAL COLLABORATION

Horizontal collaboration among countries is difficult in seed production since this involves moving patented genetic material across national borders. However, due to the frequent contacts among NARS representatives in seed production organizations, some general areas of collaborative research have been identified which are not restricted by boundaries. Responsibilities have been distributed among NARS to solve common problems in seed production.

2.1. EVALUATION OF SEED TREATMENTS: The goal of this effort is to identify chemical seed treatments which protect the emerging crop for at least 3 weeks. The responsible countries are El Salvador, Guatemala and Nicaragua.

2.2. SEED PATHOLOGY: Responsibility in conducting research in seed pathology, such as ongoing work on the evaluation of seed borne diseases, has been assumed by Costa Rica and Panama.

## 3.0 PROMOTION OF SEED STRATEGIES

During 1988-89 a strong effort will be devoted to consolidate seed strategies in Haiti and Honduras according to the methods outlined in the document of objectives and priorities for 1986-90.

## III. AGRONOMY

### 1.0 Individual Country Projects

#### 1.1. Guatemala:

Presently, 5 coordinated agronomic trials with ICTA have been established at various locations. The specific issues addressed in these trials include the following:

1. Interseeding various legumes within maize at different seeding dates. Previous data indicates that interseeding *Stizolobium* spp., 30 days following the planting of maize resulted in improved grain yields and was also effective in controlling problem weeds. Other legumes included in this trial include *Canavalia* spp., *Sesbania* spp. and



Vigna spp.

2. Legume rotations for the pacific regions of Guatemala are especially important where dry season crops have become increasingly popular. This trial targets two species of Canavalia spp., Kudzu (Pueraria phaseoloides), Stizolobium spp. and Vigna spp. During the Sustainability tour which was recently completed in Honduras, El Salvador and Guatemala (15 agronomists), this was one of the trials which was suggested to enhance "regional collaboration".
3. Due to the continued problem of insect damage at planting, various different products, methods and rates are being evaluated at the ICTA experiment station in Cuyuta.
4. As described in a previous trip report, various methods of fertilizer placement and fertilizer combination sources have already been investigated and as such are continuing in maize production areas dominated by soils derived from volcanic ash. This trial is now being considered by the Sulfur Institute in Washington D.C. for potential support and for outside funding of Master Degree scholarships. With the combined efforts of Elio Duron (Honduras) and Baltazar Moscoso (Guatemala), it is also hoped that this trial will lead to the development of an alternative fertilizer source specifically for these soils.
5. Initiated in 1987, two fertility trials are being continued which were started primarily to detect and establish critical levels for N and P in the Coastal Plain area of Guatemala.

## 1.2. HONDURAS:

Various visits were made to Honduras simply to help in the planning stage of research trials for all of the regions in the country where Recursos Naturales is involved. Honduras does a good job of bringing everyone together for a one week period whereby each regional group presents the results from the previous cycles trials. This year, CIMMYT funded another subsequent reunion (one month after presentations from the previous cycle were made) that concentrated on the planning of research trials, such that errors which were brought out in the presentation stage would be caught prior to actual implementation. Although CIMMYT criticism of the trials was in fact severe, all those involved in this one week planning session were pleased with the changes requested for the proposed field trials.

As mentioned earlier, the fertility trial which has been implemented in Guatemala will also be harvested at 14 different locations in the next two months in Honduras. It is important to mention that these trials are an addition to the workload they

presently handle. However, involvement by the national programs in this trial has been voluntary. In association with this trial, crucial soil test analysis is being run to initiate a soil test data base which is also being established in Guatemala and El Salvador.

### 1.3. El Salvador:

Involvement in El Salvador has concentrated on research trials that fit more specifically into On Farm Research (OFR). These trials which are aimed primarily at reducing the amount of land which is annually burned, also have added fertility treatments which should detect phosphorus, sulfur and residual N deficiencies. Recently we purchased a computer to aid in statistical analysis and training as well as the storing of a soil test data base from which correlation, calibration, recommendation work can be completed. At present, we are planning to unite all C.A. National Program soil testing lab directors the first week of December to finalize details on the data to be collected for initiating this work.

### 1.4. Dominican Republic:

Project support to CESDA has focused on the severe soil erosion problems in Luperon. Similar to the trial in El Salvador, CIMMYT is assisting in an "on farm" research project which will hopefully convince farmers not to burn the fallow crop residue, subsequently employing needed conservation tillage practices. Other activities in the Dominican Republic have included formal training in conservation tillage, soil fertility applications, consulting the soil testing laboratory as to the use of proper analytical procedures and statistical analysis.

### 1.5. Nicaragua:

Some difficulty has been encountered in the initiation of coordinated work in Nicaragua. However, various trials are planned to aid in the management of minimum tillage under center pivot irrigation this coming cycle. Unfortunately, major progress in Nicaragua is not anticipated in the near future due to the political situation at hand. Ironically, Nicaragua needs the most help but is also the country where CIMMYT's agronomic research support will have the least impact.

### 1.6. Haiti:

Due to the political unrest, my first visit to Haiti was not made until this past June when the President was overthrown. Fortunately, Hugo was in no mood to stick around to observe the fireworks, so we departed to the Dominican Republic on an hours

notice. However, I will be returning this coming September to conduct a one week agronomy/maize production training course (for approximately 30 national staff) which Ousmane Guindo had requested.

#### 1.7. Costa Rica:

Presently, most of our support to Costa Rica has been on the statistical analysis side. Because of the involvement of the FAO and the Italian Government, agronomic technical support is not limiting. However, we have been successful in assisting them with statistical analysis training workshops that were conducted for both UCR and MAG staff.

#### 1.8. Cuba:

Support to Cuba has presently been in the donation of a computer, its installation and training personnel to use this system both for general word processing and statistical analysis. The actual direction of continued support will depend upon subsequent visits.

#### 2.0. Potential for future Agronomic Research Projects

While operating for the "long term" within projects that are "short term", it very quickly becomes evident that the future depends on educating key national staff that can carry the torch into the year 2000. Although I have not received a direct commitment from the Sulfur Institute on a project proposal which I recently submitted, it is hoped that two M.S. scholarships will be funded along with the associated involvement of two U.S. universities in a coordinated research project.

Also, I feel that this kind of involvement is prudent in the sense of generating outside interest and outside funding which is definitively needed in the agronomic areas.

Depending upon the availability of time, Hugo and I plan to initiate a small breeding/agronomy project which will focus on N utilization efficiencies. Moll and Kamprath at North Carolina State University have successfully demonstrated that selection for N use efficiency under low inputs is possible given the collection of four tissue analysis parameters.

#### IV. CONSULTATION ACTIVITIES

##### 1.0 Germplasm Development and Improvement/Seed Technology

January 4-10

Guatemala

Evaluation of inbred's nurseries at Cuyuta, reviewing planting plans for main season planting in the lowland and highland, preparing papers on Maize in Latin America to be presented in CIMMYT Strategic Planning.

January 11-17

Panama and Costa Rica

Delivering lectures on hybrid development and inbred and foundation seed maintenance at Chitre. Organizing PCCMCA Meeting with directors of research, discussing seed certification activity with Oficina Nacional de Semillas in San Jose, Costa Rica.

January 18-24

Guatemala

Preparing working plans for 1988-1989, and paper for Maize in Latin America.

January 25-31

Mexico

Presenting paper "Maize in Latin America" in conference in Strategy Planning for the year 2000 and beyond at CIMMYT headquarters.

February 1-7

Guatemala

Attending presentation of results from research (breeding and agronomy) at Chimaltenango, harvesting at Cuyuta.

February 8-14

Guatemala

Preparing Work Plan for 1988-1989 in Central America and Caribe, adjusting details on planting plans in Guatemala.

February 15-21

Cali, Colombia

Attending Strategic Planning conference for Latin America.

February 22-28

Guatemala

Attending workshop on result of 1987 in research in Breeding and Agronomy in San Jeronimo, Baja Verapaz and planning for the second half for 1988.

February 29-March 6

Guatemala

Attending workshop for 1988 research priorities for the highland.

March 7-13

Guatemala

Orienting maize research planning for the lowland at Cuyuta and planning seed production of foundation seed inbred parents and maintenance of open pollinated varieties.

March 14-15

Guatemala

Preparing papers to be presented in PCCMCA meeting.

March 16-27

Costa Rica

Attending XXXIV Annual Meeting of Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios. Three papers presented. 350 scientists and technicians from Central America and Caribe attended panel on Production of Sustainable Agriculture addressed by Maize CIMMYT Regional Staff from Central and South America.

March 28-April 3

Guatemala

Attending harvest and field day with seed producers on demonstration of new hybrids to be released for future seed production at Cuyuta.

Results Presentation

April 4-10

El Salvador

Harvesting S1 evaluation trial second cycle of recurrent selection for yield on Stunt Collaborative Project at San Andres. Attending the Third Annual Workshop of the Seed Industry planning for seed technology research and 1987 results on the same issues.

April 11-17

Guatemala

Attending workshop on adjusting planting plans for 1988 in Quetzaltenango. Harvesting collaborative projects on inbred lines and top crosses at Cuyuta.

April 18-20

El Salvador

Reviewing Planting plans for the second half of 1988 in breeding and seed technology research.

April 21-26

Costa Rica

Orienting preparation of the national hybrid project with directors of research MAG, Oficina Nacional de Semillas, Universidad de Costa Rica and Consejo Nacional de la Produccion.

April 27-30

Honduras

Attending workshop on Priorities for Research and Planning on

Breeding and Seed Production. Presentation of progress on collaborative project in germplasm, development and improvement for ear and stalk rot.

May 4-5

Dr. Ronald Cantrell visited Guatemala to discuss future operation of CIMMYT activities in the region. We paid a visit to ICTA submanager Ing. Mario Ozaeta.

May 8-14

Nicaragua

Reviewing planting plans for the second half of 1988. Foundation seed production, collaborative stunt project and breeding for mid altitude areas were discussed, international testing (EVT'S and ELVT were located).

We visited the Chinorte Swiss cooperation project located near the Honduras border. On farm research on exploratory trials involving 3 factors (weed control, nitrogen and insect control) at 2 levels were planted in 4 location with two replication per site. In addition variety trials involving early and cultivars adapted to low moisture condition were also planted at 4 locations.

May 15-18

Guatemala

Preparing collaborative trials to be distributed among the countries involved in this horizontal collaboration.

May 19-25

El Salvador

Harvesting inbred lines from isolation for maintaining and verification test from new single crosses, decision to be taken on a new hybrid combination have relative merit in final decision in the releasing a pure genetic seed.

May 26-31

Guatemala

Preparing collaborative trials to be distributed among the countries involved in this horizontal collaboration.

June 1-2

Reviewing crossing blocks of hybrid combination necessary to produce the proper amount of seed for future double and three-way cross hybrid.

June 3-6

Cuba

\*Outlined earlier

June 7-8

Panama

\*\*Visited seed production plot of the best single crosses

planted at Via de los Santos Experimental Station in Chitre, 300 miles west of the city of Panama.

June 9-10

Guatemala

Planting international trials at Cuyuta and La Maquina Experimental Station.

June 13-17

Haiti, Republica Dominicana

Visit on farm research trials at Les Cayes and foundation seed isolation plots at levy farm. Downey mildew is becoming a limiting factor for maize production in Les Cayes plains, fortunately La Maquina 7827 is showing tolerance compare to the local criollo which have more 30% losses due to its susceptibility to the disease. On farm trials at Petit Goave are showing better responses to zero tillage however plan density is not uniform to make good comparison on the alternative tested.

At CESDA, in the Dominican Republic, we selected 500 ears for maintaining and seed production of San Cristobal 8328. The program for two years schedule was prepared in breeding and seed production.

June 20-25

Honduras

Planting at Omonita, Comayagua, Danli.

June 27 July 2

Guatemala

Scoring vigor on inbreed nurseries on normal and QPM at Cuyuta, reviewing trials planted at La Maquina, San Jeronimo. Evaluating crossing blocks at San Jeronimo, Chimaltenango and Quetzaltenango.

## 2.0 Agronomy

January 10-16 : Chitre, Panama. Seed production workshop.

January 19-21 : Comayagua, Honduras. Review of project results.

January 23-30 : El Batan, Mexico. CIMMYT Long Range Planning.

February 2-6 : San Cristobal, Dominican Republic. Review of project results.

February 15-19: Cali, Colombia. Regional Conference, Long Range Planning, CIMMYT.

February 22-26: Comayagua, Honduras. Planning session for Recursos Naturales research trials.

- March 1-4 : Managua, Nicaragua. Review of Region II Research Projects.
- March 6-10 : Denver, Colorado. Soil Fertility Workshop.
- March 14-16 : San Salvador, El Salvador. Planning of research trials for the area Opico Quezaltepeque.
- March 21-25 : San Jose, Costa Rica. PCCMCA meeting.
- April 1-16 : Guatemala City, Guatemala. Planning for agronomic field trials coordinated with ICTA.
- April 18-22 : San Salvador, El Salvador. Site selection and implementation of agronomy research projects.
- April 25-28 : Comayagua, Honduras. Selection of research trials, Recursos Naturales.
- May 9-12 : Leon, Nicaragua. Area visit and planning for research projects.
- May 15-21 : Luperon, Dominican Republic. Team visit to project area (conservation tillage trials).
- May 30- June 3: Esperanza, Honduras. Site visits and planting of soil fertility trials for volcanic ash soils.
- June 12-17 : Les Cayes, Haiti. Preliminary visit/planning.
- June 27-30 : San Jose, Costa Rica. Project proposal with the University of Costa Rica.
- August 2-4 : Chitre, Panama. Planning of Sulfur Response trials.
- August 7-13 : El Salvador, Guatemala, Honduras. Sustainability Tour, with agronomy project leaders.
- August 18-19 : San Salvador, El Salvador. Computer training and project review.
- August 28- September 3: Havana, Cuba. Agronomy program review and installation of CIMMYT donated computer.

The "sustainability tour" (August 7-13) involved 16 national program staff from 8 different countries. This was extremely beneficial in terms of collaborative learning and what is expected to evolve into collaborative research programs. While the fruits of this tour are presently not visible, it is also hoped that this will lead to more "horizontal cooperation".



## V. TRAINING ACTIVITIES

### 1.0 IN COUNTRY TRAINING

#### 1.1 PANAMA

In order to develop strong national program activities in maize, and seed production, a training course "Agronomy and Technology and Seed Production" was held in Chitre, Panama, January 9-11. Thirty five ingenieros agronomos from the Comite Nacional de Semillas, IDIAP, Facultad de Agronomia, attended research lectures which included topics such as soil preparation, fertilization, etc. Also in attendance were various private seed producers.

H. Muhtar, N. Bajet, W. Raun and H. Cordova gave the principle lectures. The under secretary of agriculture, encouraged seed production within Panama for future hybrid use in this country.

#### 1.2 CUBA

A maize training Course was held at the Jiquima Experiment Station located in Honquin Province, 1,000 km north of Habana. We arrived at Holguin Via Cubana Saturday June 4. I lectured them for 8 hours on the following topics, and exercises were practiced for every topic discussed.

- Methods of selection for improving open pollinated varieties
- Hybrid Breeding schemes
- Breeding for adaptation to Biotic and Abiotic stresses.

Materials on the topics mentioned above were distributed to the 30 participants in the maize training course. At the end of the conference an evaluation of the comprehension and effectiveness of the topics selected was handed out to the students by the Ovido Rabi, coordinator of the training course. Participants in this " Post Grado " training course involved staff from the certification department, seed production division, breeding, agronomists and plant protection department at "Instituto de Investigaciones Horticolas."

### 2.0 WORKSHOPS AND CONFERENCES

#### 2.1 SEED INDUSTRY WORKSHOPS

The III Annual Seed Industry Workshops was held in El Salvador April 7 and 8. 30 scientists from CENTA and various other seed producers attended. Seed technology research and progress in maize cultivars was presented from 1987 results. Strategies for seed industries were also recommended. CIMMYT was commended for supporting the seed industry. H. Cordova received II ANNUAL SEED INDUSTRY AWARDS established by the Asociacion Nacional de Productores de Semillas.

## 2.2 PLANNING SEMINARS

Presentation of 1987 results, Breeding seed technology and agronomy plans for 1988 were divided the first quarter of the year between El Salvador, Guatemala, Honduras, Republica Dominicana, Costa Rica and Panama. Main achievements and new strategies for CIMMYT staff contributions in assisting and orienting NARS were discussed.

## 2.3 AGRONOMY/STATISTICS

Various workshops have been conducted in the region which addressed agronomic problems and the associated use of statistical analysis for improved project work. We have combined these two areas such that design, objectives, problems and proposed solutions are considered all at the same time. This approach utilizing the actual computers which we have purchased as the communication avenue appears to be working well.

## 3.0 REGIONAL MEETINGS

### 3.1 PCCMCA

XXXIV PCCMCA Annual Meeting was held in Costa Rica, March 21 to 25, 350 scientist from Latin America countries attended this meeting.

CIMMYT Regional Maize Programs addressed the meeting with the principal panel sustainability in Agriculture production in which we present:

Germoplasm Development and Improvement	S. Pandey
Agronomy	W. Raun
Crop Management	L. Alvarado
Chairman	H. Cordova

(See proceedings)

The EPR team visited Costa Rica during the meeting. Regional staff, W. Raun, H. Cordova, J. Martinez and G. Sain gave the presentation (5 hours) on the region activities. The EPR team attended the panel on sustainability issues in agriculture and spent 3 hours with NARS representatives discussing perspectives and obtaining information about CIMMYT's regional efforts.

### 3.2 ANNUAL MEETING MAIZE COORDINATOR FOR CENTRAL AMERICA AND CARIBE.

This meeting was held May 1-5, 1988. Attending were 9 coordinators form Central America and Caribe, W. Raun, T. Barker and H. Cordova from CIMMYT. (See proceedings)

#### 4.0 GRADUATE STUDENTS

##### 4.1 SALVADOR CASTELLANOS

Coordinator of the Maize Program at ICTA-Guatemala received a fellowship from CIMMYT for English training at ISU to further pursue his Ph D. in Plant Breeding under Dr. Arnell Hallauer, with a grant from BID-ICTA.

##### 4.2 BALTAZAR MOSCOSO

Agronomist from ICTA. He finished his MSC in Agronomy from New Mexico. Mr. Moscoso returned to ICTA -Guatemala as Agronomist in the Maize Program. His scholarship was funded by CIMMYT and the Swiss government.

##### 4.3 JOSE LUIS QUEME LEON

He is in the process of obtaining his MSC in Plant Breeding at Chapingo. His thesis work is part of the project for hybrid development conducted under H. Cordova advise.

##### 4.4 JOSE SPAILLAT

He is from Dominican Republic and is finishing his MSC degree in Agronomy under direction of Dr. Raymond Gallager at the University of Florida in Gainesville. Thesis work is related with nitrogen uptake in subtropical maize germplasm and is being sponsored by CIMMYT and the SWISS government.

#### VI. COMMUNICATION INFORMATION

##### PUBLICATIONS

- AVANCES EN EL SEGUNDO CICLO DE MEJORAMIENTO PARA RESISTENCIA AL ACHAPARRAMIENTO EN DOS POBLACIONES DE MAIZ (Zea mays L.)
- ESTIMACION DE PARAMETROS DE ESTABILIDAD PARA IDENTIFICAR LA ADAPTACION DE TREINTA Y SEIS CULTIVARES DE MAIZ, EVALUADOS EN DIEZ Y SEIS AMBIENTES DE CENTRO AMERICA, PANAMA Y EL CARIBE. 1987.
- \*\*RESPUESTAS CORRELACIONADAS PARA RENDIMIENTO Y CARACTERISTICAS AGRONOMICAS DE HIBRIDOS DOBLES Y TRIPLES DE MAIZ EVALUADOS EN CUATRO LOCALIDADES DE GUATEMALA, 1987.
- \*\*EVALUACION DE HIBRIDOS TRIPLES Y DOBLES DE MAIZ DE GRANO AMARILLO EN PANAMA, 1987.
- \*\*ESTIMACION DE ACTITUD COMBINATORIA GENERAL DE LINEAS ENDOGAMICAS MAIZ Y MEJORAMIENTO DE LOS PROGENITORES DEL

HIBRIDO HB-83-GUATEMALA 1987.

\*\*XXXIV PCCMCA, SAN JOSE, COSTA RICA, MARCH, 1988

- MAIZE IN LATIN AMERICA, CIMMYT STRATEGIC PLANNING, EL BATAN, MEXICO
- PRODUCCION SOSTENIDA DE LA AGRICULTURA: MANEJO Y CONSERVACION DEL SUELO: UN ESFUERZO INTEGRADO PARA EL MANTENIMIENTO DE LA PRODUCTIVIDAD. XXXIV PCCMCA, SAN JOSE, COSTA RICA. MARZO, 1988

The communication network (EMAIL) for each of the countries in our region has been given considerable attention but is presently not operating. This coming month, Honduras, Costa Rica, Panama and the Dominican Republic should be set up to use this access system.

VII. NEW MAIZE CULTIVARS RELEASED

COUNTRY	NATIONAL NAME	ORIGIN	OBSERVATION
El Salvador	CENTA PASAQUINA	Tuxp Sequilla Criollos	Adapted drought stress
El Salvador	HE-53	43,73,76 local	Hybrid resistant to stunt
Guatemala	HB 83M	43,29,22	High yielding hybrid tolerant to ear rot
Guatemala	HE 46	POOL 21,28 26	Early yellow hybrid tolerant to ear rot
Nicaragua	NB-12	76	Resistant to stunt
Honduras	H-29	ETO, Colima Comp 2, Laposta.	High yield, white hybrid tolerant to ear rot
Honduras	Choluteca	Santa Rosa 8073	Tolerant to stunt
Honduras	Comayagua	Comayagua 8528	Tolerant D. Mildew
Honduras	Santa Catarina	Raque X TOC 7528 Local	Midaltitude adaptation yellow flint.
Costa Rica	Guarare	Guarare 8128	Yellow Dent
Panama	H-8801	DC-86	Yellow hybrid from S.K. Vasal
CUBA	A7921	Across 7921	Early Yellow Flint
Rep Dom.	CESDA 88	Frances X 26,24,28	Synthetic resistant to stunt
Rep. Dom.	San Cristobal 8328	San Cristobal 8328	Uniform

## VIII. DEMAND OF GERMPLASM FROM NARS

Honduras, Guatemala and Costa Rica are requesting extra late white flint maize cultivars resistant to ear and stalk rot for planting under heavy rainfed conditions along the Atlantic Coastal lowlands. The actual germplasm from CIMMYT does not support field deterioration (farmers leave the maize crop in the field for more than two months after physiological maturity) suggestions are made to the germplasm improvement and pathology groups to emphasize this task in the extra late tropical pool.

## IX. NAME OF INSTITUTION AND MAIN CONTACTS MENTIONED IN THIS REPORT

### EL SALVADOR

CENTA: Centro Nacional de Tecnologia Agricola  
Director Ing. Armando Alferez  
Jefe Division de Tecnologia de Semillas: Carlos Mario Garcia  
Jefe Division de Certificacion de Semillas: Romeo Lopez Sanchez  
Jefe Division de Investigacion: Enrique Mancilla  
Coordinador Programa de Maiz: Raul Rodriguez Sosa

### HONDURAS

DIA-SRN  
Director General de Agricultura: Dr. Leopoldo Alvarado  
Director de Investigacion: Dr. Roduel Rodriguez  
Coordinador Programa de Maiz: Ing. Luis Brizuela

### NICARAGUA

MIDINRA  
Director Centro de Granos Basicos: Salvador Rios  
Director EMPROSEM: Norman Padilla  
Director de Extension Agricola: Edgar Berrios  
Coordinador Programa de Maiz: Roger Urbina

### COSTA RICA

MAG  
Director General de Investigacion: Jesus Hernandez  
Coordinador Programa de Maiz: Jose Gonzalez

### UNIVERSIDAD DE COSTA RICA

Director Estacion Experimental "Fabio Baudrit": Rodolfo Araya  
Mejoradores de Maiz: Kenneth Jimenez y Carlos Salas

Director Ejecutivo Oficina de Semillas: Orlando Ramirez  
Coordinador Programa de Maiz Consejo Nacional de la Produccion:  
Javier Alfaro

### PANAMA

IDIAP  
Director General: Tomas Noriega  
Coordinador Programa de Maiz: Alfonso Alvarado  
Comite Nacional de Semillas: Gonzalo Gonzalez