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PROGRESS REPORT No. 13

PROJECT : AGRICULTURAL TECHNOLOGY DEVELOPMENT IN PANAMA

CONTRACT : USAID/PANAMA No. 525-0180-C-00-2015

PERIOD : JULY 1 TO SEPTEMBER 30, 1986

This report is submitted as part of the requirements of the USAID contract on the project "Agricultural Technology Development in Panama" for the Technical Assistance component and provided by specialists of Rutgers University to IDIAP. Activities and accomplishments of the project and the Technical Assistance component for the period between Jul. 1 and Sept.30, 1985 are described here, in detail.

This report is being subdivided into four main sections following the reports from each of the four (4) specialists, components of the Rutgers Technical Assistance Team. This sections are:

I. Tropical Pastures, Dr. Pedro Argel;
II. General Agronomy, Dr. Mark Gaskell
III. Soil Fertility and Management, Dr. Alvaro Cordero
IV. Agricultural Research Administration and Management, Dr. Carlos A. Neyra.

A fifth team member will be incorporated to the project, soon. Dr. José Zorrilla-Ríos has been selected by a Rutgers Search Committee and will visit Panama for interviews during the first week of October.

CARLOS A. NEYRA, ATD Project Coordinator in Panama

ATD-PANAMA PROJECT

CONTRACT No. 525-0180-C-00-2015

REPORT No. 13

CONTENTS PAGE

CONTENTS PAGE

PROGRESS REPORT

JULY 1, 1985 - OCTOBER 1, 1985

Dr. Pedro J. Argel, Pastures Specialist

I. TROPICAL PASTURES

1.0 Background

The definitiive trial in pasture research includes grazing animals. A increasing number of germplasm selections which were introduced into Panama several years ago is arriving at the point of grazing evaluation. These experiments generally are long and costly but it is the way that the value of the species and the interaction with the ecosystem and mangement can be quantified. The fact that one runs the risk of having forrages of little value for the animal, of poor persistance, or susceptible to insects or diseases even in these advanced stages of evaluations, demands that the search for alternatives be continuous. In other words, it is important to have a continuous stream of germplasm with characteristics superior to those of the discarded species. It is because of this, that the work of introduction, preliminary evaluation, yield testing, and management and productivity evaluation are continuous in a forage research program.

2.0 Germplasm

The first germplasm adaptation experiments established in Los Santos and Sona were completed during the reporting period (Regional Type A Trials, ERA) The most outstanding species have been established in each experiment to quantify periodic yield (Regional Type B Experiments, ERB). The Sona ERB was recently planted and at the same time, the Los Santos ERB was under evaluation in its highest rainfall period. Both experiments, including the evaluation methodology are under the total control of IDIAP researchers.

Another ERB was established in July and August on the Faculty of Agronomy Farm in Rio Hato. Ing. Gregorio Gonzalez of FAUP-INIA is responsible for the experiment. A total of 27 forage species including grasses and legumes were established and the germination and early growth has been excellent. Rio Hato has an ecosystem similar to the Azuero Penninsula (Tropical Dry Forest), but with greater average precipitation (1508 mm.). The soils are classified as Alfisols with a pH of 6.0 and insignificant aluminum saturation. In general, it represents an area representative of a large variety of forage species, particularly those with drought tolerance.

A new ERA was also established during the month of September at El Coco near Penonome. IDIAP researchers took the initiative for the germplasm evaluation in this zone which is characterized by

Inceptisols with a pH of 6.3 and traces of aluminum. The established germplasm group includes legumes and a group of Brachiarias. The germination and establishment of the species has been normal.

2.1 Brachiarias

The Chiriqui and Gualaca trials are the most advanced of different trails of 21 ecotypes of Brachiarias established in different parts of the country. Table 1 shows visual evaluation results of drought tolerance at these sites and great variability in this natural phenomenon is apparent. Species such as B. dictyoneura 6133 and the group of B. humidicolas are the most tolerant. One observes also that the range of variation is much greater at Chiriqui Farm than at Gualaca because drought stress is less severe at Gualaca.

Severe attacks of spittlebug have been observed at Chiriqui Farm. Table 2. shows the variations in populations of nymphs and egg masses in the different ecotypes. It is clear that there is not a relationship between egg masses and nymphs and this is probably due to variations in egg mass size that could be associated with variations in microclimate created by the different pastures species present. The range of variation in number of nymphs/ m2 varied from 10 for B. Decumbens 6131 to 113 for B. humidicola 6705 and 675 respectively.

The tolerance to spittlebug is quantified by the productive capability of the species in conditions of infestation. Table 3 shows that B. humidicola 6707 produced greater forage yield at the same time it was highly infested (109 nymphs/m2) which indicates a very good tolerance to the insect. In general, B. humidicola and B. dictyoneura 6133 have shown relatively good development in the soil and climate conditions of Chiriqui Farm and acceptable forage yields. Gualaca possesses better soil conditions and the insect is absent, and forage yields are higher and less variable as shown in Table 3. Nevertheless, species such as B. eminii 6241, B. ruziziensis 6291 and B. brizantha 664 have shown relatively low yields at both sites.

3.0 SEED MULTIPLICATION

Seed multiplication plantings of promising experimental lines have been made in Calabacito. The established species include B. dictyoneura 6133, S. guianensis 184, C. macrocarpum 5062 and C. sp. 5227. Plots of S. capitata 'Capica' and C. macrocarpum 5065 have also been maintained in this manner. Small plots (1000 m2) of S. hamata 147, S. guianensis 184, C. scabra 1047 and B. dictyoneura 6133 were established in Los Santos. These plots have been placed on farmer's fields and in El Ejido were carried out with the initiative of IDIAP researchers. This shows the advance of the promising germplasm from the ERA and reinforces the need ot maintaining seed stocks for future stages in the

evaluation process.

3.1 B. decumbens

An experiment was conducted to determine the effect of pile size and time of threshing on internal pile temperature variations and yield and quality of B. decumbens seed. The results from Table 4 show an increase in crude seed yield after four days of drying, independent of pile size. This is because the drying allows the maturing and opening of the physiologically mature hulls but they remain attached to the inflorescences. Nevertheles from 4 days on, the yield tends to decrease probably due to rotting and decomposition of the glumes which affects the final weight of harvested material. With drying, the crude seed yield increases but a higher percentage of empty hulls is indicated by the caryopsis content of the samples and this may be associated with various other seed formation factors. The internal pile temperature reached 41.5 ^{0} C. and only changed greatly with piles higher than 80 cm. The affect of temperature on seed viability is currently being analyzed.

4.0 ESTABLISHMENT AND MANAGEMENT

4.1 Weed Control

A new experiment was established at Gualaca in September to determine the effect of the herbicides Picloran + 2,4- D and Dicamba + 2,4- D mixed in various proportions with water, water/diesel, and a surfactant on the control of the brush species Portobelillo, Chumico, and Guayabo. The herbicides were 1.0, 2.0, 3.0 and 4.0 % in water and 60:40 and 80:20 water/diesel, respectively. A total of 36 treatments were applied with wiper to the base of a total of 180 shrubs.

Previous trials with the same species has indicated the susceptibility of Portobelillo to Picloran + 2, 4- D and the resistance of the other shrubs to the same control. It is hoped to apply a new herbicide wiht a wider range of doses and the addition of diesel to better study the cost and effectiveness of the mixture water/diesel/surfactant. The experiment will last five months and it is considered the last of a series that then will then be analyzed and the results published.

5.0 GRAZING EVALUATION

5.1 Calabacito

Advances have been made in the grazing trial establishment. The most advanced association with respect to establishment (3.0 ha.) is the B. dictyoneura 6133 and kudzu; both species germinated and are growing normally. Other treatments established more recently are A. gayanus and C. macrocarpum 5062; A. gayanus and S. capitata; Faragua and S. capitata and lastly B. humidicola and kudzu. The lack of uniformity in germination of some plots of A.

gayanus and S.capitata as well as Faragua has been a big problem in the establishment. Replantings have been made, but even so the experiment will not be ready for grazing this year, Some plantings will remain for next year. The great effort made by IDIAP researcher Ing. E. Arosemena in the establishment effort should be recognized, however.

5.2 Faculty of Agronomy (FAUP)

The last week of August, grazing was initiated on the pasture persistance trial (Regional Trial, ERC), on the farm of the FAUP in Chiriqui. Ten calves of 250 kg. each were chosen and weighed. The distribution was made at random to the different treatments. The first rotation of animals over the two repititions is soon to be completed. This initial exercise has served to accustom the animals and familiarize the researchers of the FAUP with the details of the management of this type of trial. The provision of water has been the biggest daily problem, but fortunately, funds for the construction of the a watering system have been approved. Recently, samples were taken from the pastures to determine availability and botanical compositon of forage present.

5.3 Gualaca

Final preparation for the animal production trials (Regional Trial D, ERD) and the pasture persistance trial (Regional Trial C, ERC) has been completed. Pasture division, drinking system construction and electric fence line placement has been completed in the ERD. A group of 90 calves were obtained from a rancher to serve as experimntal animals. It is hoped to begin the grazing adaptation period shortly. The final establishment phase including weeding and replanting, is continuing with the ERC. Both trials should begin controlled grazing before the en of the year.

6.0 FUTURE PLANS

The emphasis on grazing experiments will be continued along with the agronomic evaluation of promising species, primarily of the genera Brachiaria, Centrosema and Stylosanthes. The present cycle will consist primarily of planning of agronomic trials and seed multiplication for 1986. This last area is of special importance due to the interest shown by IDIAP and ENASEM (National Seed Company) to develop and concentrate the multiplication of forage seed in Rio Hato. Dr. Argel will participate in a cooperative program being planned by the two groups.

Preliminary discussions have been made with researchers from IDIAP and the Soils Specialist from Rutgers for the planning and conducting of a workshop on the management of acid soils to be carried out in 1986 in coordination with CIAT. Initial contacts will be made in the next few months.

Table 1. Visual rating of drought tolerance of 21 ecotypes of Brachiaria. Gualaca and Chiriqui Farm, 1985.

ECOTYPE		RATING SCORE *	
		Chiriqui Farm	Gualaca
B. dictyoneura	6133	91.0	65.0
B. humidícola	6369	89.0	77.0
B. humidícola	675	89.0	70.0
B. humidícola	679	86.0	72.0
B. humidícola	6707	85.0	73.0
B. humidícola	6705	84.0	70.0
B. humidícola	682	82.0	73.0
B. humidícola	6709	68.0	67.0
B. decumbens	(Control)	52.0	40.0
B. eminii	6241	51.0	30.0
B. ruziziensis	6134	51.0	32.0
B. ruziziensis	6130	49.0	33.0
B. ruziziensis	6419	43.0	32.0
B. brizantha	6298	40.0	40.0
B. brizantha	6012	38.0	52.0
B. ruziziensis	6291	35.0	32.0
B. brizantha	6009	33.0	52.0
B. brizantha	664	33.0	48.0
B. decumbens	6132	27.0	43.0
B. ruziziensis	654	25.0	33.0
B. decumbens	6131	24.0	40.0

* Rating Scale : 0-30 = Poor 61-90 = Good

31-60 = Average 91-100 = Excellent

Table 2. Mean number of spittlebug egg masses and nymphs per meter 2 in ecotypes of Brachiaria. Chiriqui Farm, 1985.

ECOTYPES	CIAT No.	EGG MASS * NUMBER	NYMPH NUMBER **
B. humidícola	6705	22.6	113.1
B. humidícola	675	23.3	113.0
B. humidícola	679	24.5	112.7
B. humidícola	6707	24.9	109.7
B. humidícola	682	23.4	107.6
B. dictyoneura	6133	17.7	89.0
B. brizantha	6298	17.7	78.1
B. humidícola	6369	16.4	76.4
B. ruziziensis	6419	6.5	74.4
B. eminii	6241	5.4	68.7
B. ruziziensis	654	6.7	46.7
B. brizantha	6012	12.3	44.0
B. brizantha	664	9.5	41.9
B. humidícola	6709	19.1	37.7
B. brizantha	6009	11.6	36.0
B. decumbens	6132	17.9	33.8
B. ruziziensis	6291	4.4	32.6
B. brizantha	6016	2.5	32.3
B. ruziziensis	6130	5.5	21.3
B. ruziziensis	6134	6.6	18.3
B. decumbens	6131	8.5	10.3
B. decumbens	(Control)	9.7	27.7

* Mean of 3 samplings every 20 days (July-August)

** Mean of 5 samplings every 20 days (May - August)

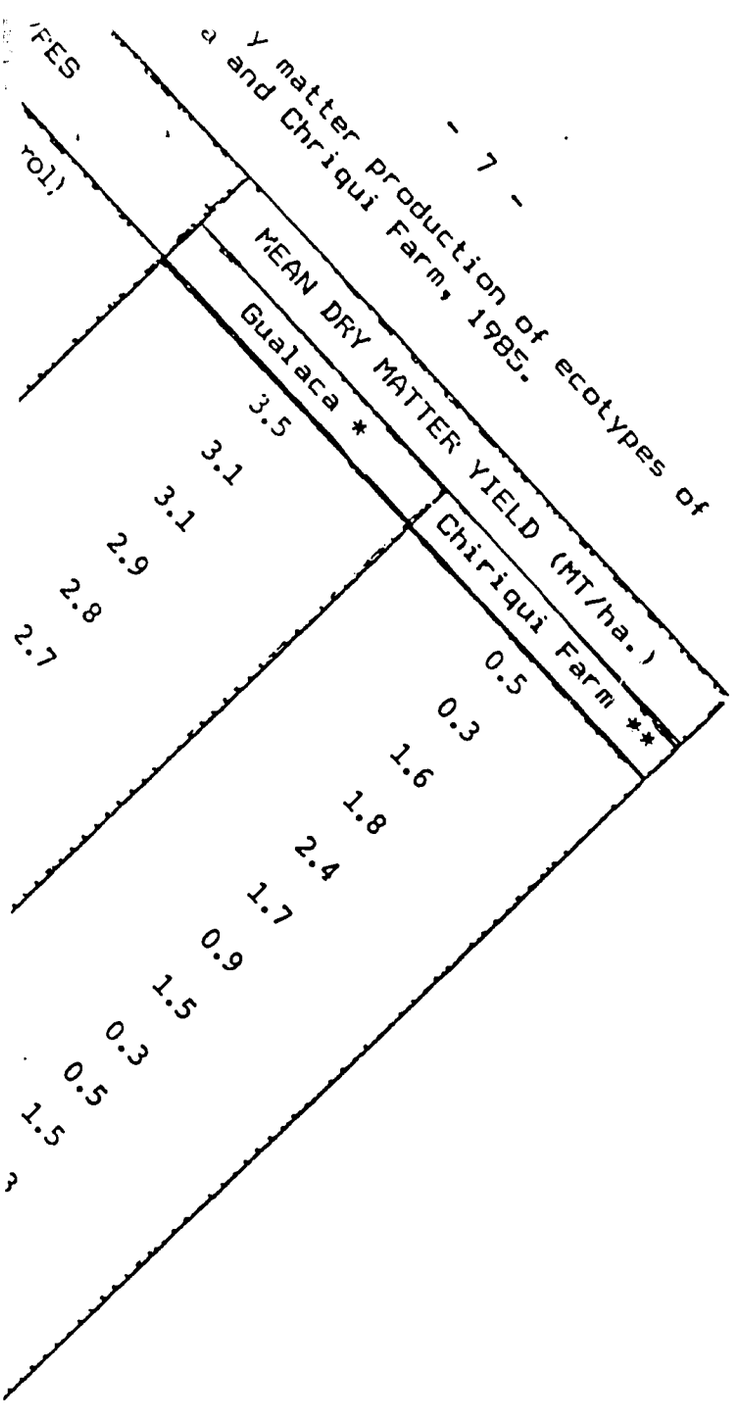

Table 4. Variations in internal pile temperature and the effect of threshing time and size on yield and quality of seed of *Brachiaria decumbens*. Gualaca, 1985.

PILE SIZE (M)	TIME BEFORE THRESHING (days)	CRUDE SEED YIELD (kg./pile)	MODIFIED PURITY (%)	CARYOPSIS (%)	INTERNAL TEMP (C)
1x1x0.40	0	0.116	80.3	47.2	31.3
	2	0.592	95.3	8.4	30.1
	4	1.083	87.3	6.0	33.3
	6	0.875	98.7	2.3	32.5
1x1x0.80	0	0.441	78.8	44.6	32.3
	2	1.125	96.8	20.8	34.6
	4	2.758	96.5	13.2	36.3
	6	2.492	89.9	2.2	41.5

Progress Report July 1 - October 1, 1985

Dr. Mark Gaskell, General Agronomist

II. GENERAL AGRONOMY

1. BACKGROUND

The primary concentration of the General Agronomist since late 1983, has been in two of IDIAP's priority research areas. The work as been with onion production in the Cerro Punta/Boquete areas and with maize and dry beans in the Caisan area. During the most recent reporting period, Dr. Gaskell's work has been exclusively devoted to the onion research program in Cerro Punta and Boquete because that area was felt to be of a higher priority. A new researcher was assigned by IDIAP in early August to work with Dr. Gaskell in onion research, to begin to take responsibility for the onion research program, and together with Dr. Gaskell to to extend the program to other important highlands vegetables.

The onion research program was a new research program initiated by IDIAP in late 1983, and has since that time primarily been directed toward the production of onions during the rainy season. Panama has historically imported between 50 and 60 % of the onions consumed, primarily because national production has been exclusively limited to a dry season harvest from February to May (for more information see Progress Reports 8-12).

2. ACTIVITIES DURING THE REPORTING PERIOD

2a. Onion Agronomic Problems

Work with on-going and new experiments continued during July, August and September. A second varietal trial was established on the Cerro Punta research station in late July and was transplanted to the farm of a collaborator in Alto Bambito on September 27. The trial consists of 23 commercial onion varieties and is intended to compare performance among these varieties in the normal planting period and with an earlier planting to be harvested at the end of the rainy season. The earlier varietal trial planting which is on another collaborating farm in Alto Trivaldo was transplanted August 20.

A separate group of varietal trials are underway in Boquete with a wider range of planting dates. A wider range of planting options exists for a larger number of growers in the Boquete area because irrigation is more widespread in that area. The primary purposes of the varietal trials at different planting dates is to compare the productivity of the various varieties outside of the normal planting period.

Semi-commercial plots (1/10 ha.) of Granex 33 onions which had been grown under the rainy season production Alternative 1 (see Progress Report #9) were harvested on a collaborating farm in Boquete on August 22. Yields as high as 1160 qq./ha. (52.7 Mt/ha.) were recorded from this plot and when compared with area averages in the normal growing period of 600 qq./ha., clearly illustrates the potential productivity of the rainy season production Alternative 1 and indicate that this offers a clear rainy season production alternative that would provide onions during the months of July, August, and September, depending on the location and time of seeding. Average grower yields are still considerably below this figure.

A separate semi-commercial plot yield as high as 1100 qq./ha. of onions produced from small bulbs brought from the central provinces was recorded on one farm in Alto Bambito in early September. Although this planting alternative has not previously been a part of the onion research program, it helps to illustrate another potential for rainy season production.

Production of onions during the rainy season months of July, August, and September has been considerably higher this year than in previous years due in part to the clear alternatives being offered by the onion research program. Monthly onion importation into Panama during the rainy season on a yearly basis since 1982 are shown in Table 2. Whereas in previous years importation began in June, in 1985 the first imported onions will be arriving in the Panama marketplace in early October. Based on the most recent reports of planned importation for the remaining months of 1985, the quantity of onions imported into Panama during the rainy season fell by 50% in 1985 and the value of those onions imported fell by 57%. Plans are now underway, particularly by growers in the Boquete area, to begin planting onions almost on a continuing basis year around.

Although Alternative 1 is a clear and viable alternative much remains to be done to improve the quality and reduce the production costs under Alternative 1 and those areas will be the focus of future research. Problems associated with Alternative 2 are also slowly being solved. Alternative 2 proposes to plant seedbeds earlier in the year so as to harvest during the December-January period. This alternative is perhaps more difficult because the onions spend their entire life under high rainfall, high humidity conditions.

A concentrated research effort has been underway since 1983 to develop a commercially viable seedbed cover for these rainy season conditions and to test the seedbed cover under on-farm conditions. The seedbed cover protects seed and young seedlings from hard rainfall and minimizes the risk associated with growing seedbeds in rainy weather, speed plant development and reduces the costs of production of onions in the rainy season. A seedbed cover system has been designed and described in previous reports and now has been tested at five locations over two growing seasons.

Table 1. Monthly onion importation by the Republic of Panama during the rainy season. 1982-1985.

YEAR /Month	QUANTITY (cwt.)	PRICE(1) ($)	VALUE ($)
1982			
June	15,000	17.50	262,500
August	20,000	14.98	299,600
October	35,000	14.48	506,800
December	20,000	13.69	273,800
TOTAL	90,000		1,342,700
1983			
June-Aug	40,000	18.78	751,200
Sept-Dec	60,000	17.76	1,065,600
TOTAL	100,000		1,816,800
1984			
July	12,500	19.16	239,500
August	15,000	19.16	287,400
September	17,500	19.16/11.94	263,100
October	20,000	11.94	238,800
November	25,000	11.92	298,000
December	25,000	11.92	298,000
TOTAL	115,000		1,624,800
1985			
June	---		
July	---		
August	---		
September	---		
October	12,500 (2)	13.00	162,500
November	20,000 (2)	13.00	260,000
December	25,000 (2)	13.00	325,000
TOTAL	57,500		747,500

1. Duty- free price, placed in Panama City
2. IMA estimate- National Onion Commission (10/8/85)

Source: National Sector Planning Directorate- Ministry of Agriculture - Panama

The most recent data (Figure 1) is consistent with the previous results and shows the clear advantages associated with the seedbed cover. Results overall have shown a two-fold to six-fold gain in seedlings transplanted per gram of seed planted and seedlings are ready for transplant two weeks earlier under the cover than in the open. The cooperating grower for this particular trial remarked that conditions were less severe than normal this year and that the advantages of the seedbed cover would be even more pronounced in an average year. The same grower spoke before the National Onion Commission at their October meeting in Santiago and recommended the seedbed cover system to growers who were present.

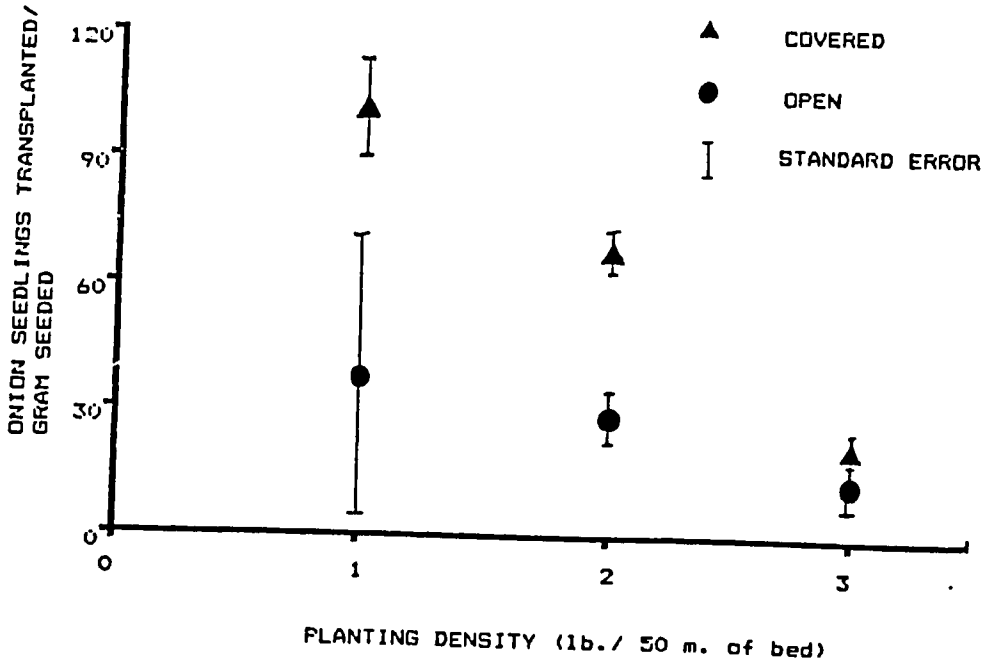

Figure 1. Number of onion seedlings transplanted per gram seeded under seedbed cover and in the open. Boquete, September 1985.

Other experiments evaluated during the reporting period sought to resolve onion production problems of a more general nature. Early seedbed weed control is a recurring problem for onion growers and hand weeding is a large expense in seedbed production. Onion growers in major production areas in the U.S. use the herbicide Dacthal (dimethyl tetrachloroterephthalate) but previous trials with Dacthal in the highlands had not shown it to be effective. Some of the problem is no doubt a result of the high organic matter soils (8-14%) which characterize the area and the high rainfall may also be a factor. Results from a preliminary trial evaluated in July (Table 2) indicate that Dacthal does offer some promise for seedbed weed control. A more complete experiment is planned for October.

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Table 2. Total weeds present in onion seedbeds receiving different preemergent herbicide treatments at 18 days after planting.

TREATENT	NUMBER OF WEED SEEDLINGS/ 225 cm.2
Control	223
Dacthal 75 wp	
(9 kg./ha. a.i.)	46
(13.5 kg./ha. a.i.)	78
(15 kg./ha.)	61
(20 kg./ha.)	52

Note: Weed seedlings were also considerably smaller in treated plots and new seedlings were germinating in all plots.

Another experiment to compare the effect of various transplanting densities on onion yield was harvested in July. The results indicate a clear advantage to alternative planting patterns that provide a higher transplant density (Table 2.) Increased yields are generally observed in onions as transplant density increases up to the point that bulbs become deformed due to crowding, or as could be the case in the highlands, disease incidence increases. This data suggests that traditional planting patterns can be considerably improved upon for optimum production. Future experiments will attempt to resolve the optimum plant spacing/plant density relationships for transplanted highlands onions. Some growers (the collaborating grower and others) have already begun to increase seeding density in their commercial production fields.

Other work with experiments comparing onion response to different lime and chicken manure/rice hull applications continued during the reporting period with transplanting and seeding into treated plots in July at the Cerro Punta location. Treatments were applied at the Boquete location in July and transplanting and seeding into treated plots was carried out in September. Sampling of treated plots to follow subsequent pH change is continuing.

Table 2. Alternative onion transplanting patterns and associated yields. Boquete, July 1985.

Traditional Pattern

X - 9cm.- X X X X X X X

25 cm.

X X X X X X X X

Alternative Pattern A

X-10cm.-X -25cm.- X -10cm.- X -25cm.- X -10cm.-X

10cm.

X X X X X X

X X X X X X

Alternative Pattern B

X -25cm.- X -25cm- X -25cm.- X

8 cm.

X X X X

X X X X

PATTERN	DENSITY (Plants/m.2)	YIELD (qq/ ha.)*
Traditional	44	832
Alternative A	60	1058
Alternative B	48	900

* Measured from unreplicated 50 m. semicommercial strips

2b. Onion Post-Harvest Management

Work with onion solar dryer designs also continued during July August and September. The experimental field-type design was tested in late August and found to acceptably cure onions in 8 days under typical rainy season conditions. A similar dryer of commercial size (100+ 50lb.sacks) was built at the experiment station in Cerro Punta and at the Horticultural Cooperative in Boquete in late September. Unfortunately, by the time the dryers were completed, the harvest of onions was over and there were not sufficient onions available to evaluate the dryer on a commercial scale.

The last week in August, onions entering the market from the cooperative in Boquete were bringing B/25.00/qq., if freshly harvested without curing and B/30.00/qq. if dry. Early trials suggest that drying typically lowers market weight about 10%. Thus, based on this 20% price differential and a cost of about B/200.00 for the construction of a commercial sized dryer, the potential exists to pay the cost of dryer construction with two dryer fillings (100 qq.). The price gains from successive dryings would be additional profit and additional storage and marketing flexibility would also result from the use of the dryer.

Plans are underway to evaluate the dryers in Cerro Punta and Boquete with the first onions harvested in December. Plans are also being made to use the dryers to evaluate the onion varietal trials after harvest to determine if differences exist among varieties in their rate of drying or in their suitability for storage.

3. TRAINING

In late August, Dr. Gaskell worked closely with visiting Horticultural consultant Dr. Charles Atlee (Agricultural Technology Transfer Project) to prepare and present a four day shortcourse on Vegetable Crop Production. IDIAP reseachers Esteban Sanchez and Campos Serrano participated along with 22 other specialists from the Extension Service of the Ministry of Agriculture, the National Bank and the Agricultural Development Bank, and the horticultural production and marketing cooperatives in Boquete, Cerro Punta, Potrerillos, and Rio Serrano, and several farmers from important Chiriqui vegetable production areas. IDIAP's Onion research program on-farm plots in Boquete and collaborating growers were used extensively in the course presentation.

In late September, planning is underway for an October 3 Potatoe and Onion Field Day at the experiment station in Cerro Punta and for a day long technical field tour on onion production for specialists of the Agricultural Development Bank.

4. OTHER ACTIVITIES

During a home leave trip to the U.S. in early August, Dr. Gaskell attended the 82 Annual Meeting of the American Society for Horticulutral Science in Blacksburg, Virginia. He presented a paper coauthored by IDIAP researcher Campos Serrano and Dr. Mark Singley of Rutgers entitled " Alternatives for Rainy Season Onion Production in the Highlands of Panama".

III. SOIL FERTILITY AND MANAGEMENT

Dr. Alvaro Cordero

A. Background

This report is submitted as part of the activities included in the plan of work of the soils specialist. Besides, to serve also as the basis for the report to be prepared and submitted to the Rutgers Project Coordinator, Dr. Carlos Neyra.

The position of soils specialist was started by the unversigned on Luly 1, 1985, six months after the void left by Dr. Luis Manrique, from Cornell University, with his departure.

I have to mention that from the start I have received all the support from the profesional staff of IDIAP starting with the General Director (Ing. Ezequiel Espinosa) and followed by Dr. Jorge Jonas, National Director of Agronomy; Ing. R. Sánchez-Díez, Regional Director and Soil Specialits: Ings. Santander Jaramillo and Benjamín Name as well as the chemist in charge of the soils lab. at Divisa, Lic. Pedro González.

May be the most important component of this quarter has been the preparation of the Work Plan prepared in concensus with IDIAP and Rutgers.

B. Start of Activities

According to instructions from Dr. Reed Hertford (IAFP/Cook College) I arrived in Panama on July 1,1985 where I was received and receptioned by Dr. Carlos Neyra, Coordinator.

The next day we visited the USAID mission in Panama City where I was introduced to the different administrative offices. We also had a brief courtesy visit to the Agricultural Division where we talked with Drs. Vigil, Bayer and Rozell. Next day we visited IDIAP Central quarters and met with Ing. Espinosa (Director), Dr. Jorge Jonas and Ing. B. Ocaña (Technical Cooperation Office). This same day we travelled in separated vehicles with Dr. Neyra to Santiago where we were received by Ing. Name and Santander Jaramillo. Later, we visited with Ing. R. Sánchez-Díez, Regional Director. Later we visited with Ing. Name the Soils Laboratory located near Santiago, at Divisa.

C. Diagnostic and Recognition of the Work Area

By visiting different localities in the region and with the collaboration of the counterpart Ing. Name, we were able to recognize the physical environment, particularly edaphic and its influence in the development of the region and the coverture by IDIAP of the visited zones. Among the principal areas visited

are: Guarumal in the South of Sona-Sub Center; Experimental Fields at Calabacito; Sub Center at Los Santos; Río Hato Experiment Station; Experiment Station El Coco in the Llanos de Coclé; Lola de Las Palmas, Los Llanos de Ocú, Santa María, Puerto Vidal, Azuero Peninsula, Las Tablas, Cerro Punta, Boquete, Montijo, Penonomé, Santa Clara, Chorrera, Calobre, Santa Fe, etc.

D. Field Days, Seminars, Conferences, Inaugurations and Working Meetings.

We collaborated in all of this events important to IDIAP through free participation in the form of commentaries, concept broadening or concept redifinition, etc. We also participated in the inauguration of the Sub-Center at Azuero.

All of this activities can be grouped as follows:

1. Field Day: MIDA's training center at Lola de Las Palmas.

   Objectives: to demonstrate to the public the establishment of an experiment on "Liming and Fertilization in Pineapples", MIDA/IDIAP/Rutgers. The visitors were able to see the setting of replicates 3 and 4 of the experiment: a) Liming practice; b) Fertilization; and, c) Planting. Explanations were offered by both Ing. Name and the Soils Specialist.

2. Roundtable "Alternatives for the Conservation of Renewable Natural Resources" organized by IDIAP, Colegio de Ingenieros Agrónomos and Centro Universitario de Veraguas. This specialist attended and participated in the discussions.

3. Research Advances at IDIAP
   a. Penonomé, August 27, 1985
   b. Sub-Center of Azuero, Los Santos, August 20.

4. Inauguration Sub-Center at Azuero, August 29.

5. Commemoration X Aniversary of IDIAP

6. Working Meetings
   1. With Dr. Robert Tate from the Soils and Crops Dept., Rutgers University. For IDIAP attended; Dr. Jorge Jonas, Ing. R. Sánchez-Díez, Ing. S. Jaramillo, Ing. B. Name, and the Soils specialist. Purpose was to discuss the reference points and activities for the Work Plan to be prepared by the soils specialist.
   2. Meeting held on August 23 at the Azuero Sub-Center in Los Santos with the presence of Dr. J. Jonas, Ing. S. Jaramillo and the Soils Specialist to discuss the first draft of the Work Plan by this specialist.
   3. On August 22 we participated in a meeting with staff from the Central Region, including the

Regional Director, Ing. R. Sánchez Díez and the Committee on Research Strategies and Objectives led by Dr. Carlos Neyra, for discussions related to a preliminary report drafted by this Commitee.

4. Meeting with Dr. Richard Hawkins of CATIE, Turrialba on September 11, held at the office of the Regional Director. The purpose of the meeting was an offer of collaboration made by CATIE to IDIAP through the program of Genetic Resources of CATIE. Collaboration was also offered for the Vegetables and Seeds programs.

5a. Visit to the Experiment Station at Calabacito on July 10 with Ing. Blas Morán of CATIE, Ing. B. Name of IDIAP and one technician from RENARE. The purpose of this visit was to select an experimental plot to set up an experiment with forest trees in acid soils with the collaboration of IDIAP/CATIE/Rutgers and RENARE.

b. On July 22 we visited the experimental fields of IDIAP and Roots and Tubers at Ocú. The visit included Ing. B. Name and Ing. José Aguilar. We discussed on the various experimental settings with particular emphasis on soil

fertility. One of the suggestions offered was to continue an experiment started on 1984 through 1985-1986 to study the possible residual effect of phosphate fertilization. It was also suggested to discuss the results obtained with the purpose of planning a new experiment within the same objectives.

c. On July 30 and 31 we visited with Dr. Robert Tate the Exp. Sta. at Calabacito to discuss on research conducted in acid soils. We also visited the soils lab. at Divisa and the Field Experiments on Cassava planted at Ocú. We also visited the fertility and liming plots at Lola de Las Palmas.

d. On August 15 another visit to Calabacito included the participation of Dr. Pedro Argel, Pastures Specialist of the Rutgers ATD team and Ing. Esteban Arosemena. Emphasis was made on the collaborative efforts between Rutgers and IDIAP on Research conducted on acid soils at Calabacito.

e. On August 7 we visited the Exp. Station at Rio Hato to collect cassava seeds from 12 varieties for an experiment to be conducted on varietal responses to acid soils, at Calabacito.

- On August 15 we travelled to Macaracas to visit the forestry nursery of RENARE to obtain 1000 small trees (from 5 different species) for an adaptation experiment at Calabacito. We also went to Montijo to collect 300 small trees from 3 different species for the same purpose.
- On September 5 we visited Calobre with representatives of BDA and ISA to visit farmer fields for the purpose of making recommendations related to the adequacy of the soils and environment for corn cropping. Also on September 5 and 6 we visited experiments set up by the Rutgers Soils Specialists in collaboration with IDIAP experts. We were accompanied on this visit by Dr. Jorge Jonas, Agr. Nelson Gratacas of MIDA, Ing. Alfonso Martínez of IDIAP. Visits included Calabacito and Lola de Las Palmas. The Agricultural National Director, Dr. Jonas was satisfied with the experiments visited.
- On September 13 we visited commercial and experimental Pineapple plantings in The Chorrera Area. The visitors included

Dr. G. Silvera, Sub-Director of IDIAP, Dr. J. Jonas, Ing, Cirilo Pérez, Technician of Pineapple of MIDA at Chorrera and Ing. J. Rodríguez, Technician in Pineapple of IDIAP. Also present were Agr. Nelson Gratacos, head of the Capacitation Center of Pineapple of Lola de Las Palmas and Ing. B. Name, Edaphologist of IDIAP.

- On September 17 we visited Cerro Punta and Boquete with Dr. Mark Gaskell for a demonstration of his research in Onions. We suggested an experiment to evaluate phosphorus management in onions grown in volcanic soils.
- On September 25 a visit was conducted to Alto de Santa Fé and Alto de Piedras in Santa Fé de Veraguas. The visit included

Demonstration plots made jointly by IDIAP/MIDA and farmers on vegetables, cereal grain crops and beans. We also visited some coffee and potatoe farms in the area. An apparent deficiency of zinc was detected on some coffee plantations and foliar samples were taken for analysis at the laboratory.

E. Training and Technical Assistance.

1. Ing. B. Name, is the counter part assigned by IDIAP and has received most of the technical assistance as in service training. Ing. Name also collaborated with the soils specialist.

2. Ing. José A. Aguilar
   Ing. Lucas Tazón
   Ing. Esteban Arosemena
   Lic. Pedro González
   Ing. Luisa Martínez
   Ing. Lineth Carranza

3. Preparation and revision of articles and other documents.

   Part of the activities by this specialist concentrated on the preparation of articles, projects and other documents as well as on the review of research reports prepared by IDIAP staff. We describe below some of this activities:

   a. Field Technical Bulletin for the management of fertilizer research in rice, prepared by B. Name and A. Cordero with the purpose of helping researchers with the setting fertility experiments on rice in addition to the use of a uniform methodology that will allow the

soils Lab. at IDIAP to prepare recommendation guides for the application of fertilizers in rice. A first draft has been completed.

b. Determination of Exchangeable Aluminum as a parameter for the liming of acid soils of Panama. The principal objective of preparing this bulletin based on literature review is to help orient, in a simple and comprehensible way, technicians and other persons involved with activities related to excesive acidity of soils and alternative solutions such as the use of liming. Because more than 60 percent of the soils in Panama are acid, IDIAP has considered of interest and importance to develop a publication on this subject. The bulletin will be authored by B. Name and A. Cordero.

c. Preparation of a research proposal for acid soils in Panama at the request of IBSRAM to IDIAP. IBSRAM stands for International Board for Soils Research and Management Inc.

d. Review of articles prepared by Ing. B. Name on "Soils in locations of livestock research: metodology of evaluation for fertility and mangement". and by Ing. Lucas Tazón: "Soil Conservation in Livestock Explotations".

e. Preparation of the Work Plan of the Soils Specialist for the ATD project. This document has been distributed for approval by IDIAP and Rutgers. The document is made of 40 pages and each activity includes background, objectives, strategies, expected results and needed resources.

F. Research

The soils specialist has participated in research projects conducted by Ing. B. Name as follows:

1. "Adaptation of forest species in acid soils". Nine species are under study: Teca, gmelina, acacia, leucaena, two eucaliptus sp., Casuarina, Cesalpina and Jagua as a control. A randomized blocks experiment with 4 replications was planted on July 16. This is a collaborative research established between IDIAP/Rutgers/RENARE/CATIE at Calabacito.
2. Adaptation of cassava varieties in acid soils. Twelve (12) cassava varieties are under evaluation for adaptation and yield in the acid soils present at Calabacito. The experimental design is randomized blocks with 3 replicates. The plant material was brought from the Exp. Sta. Río Hato and planted August 8. Collaborators are IDIAP/Rutgers.

3. Pidgeon pea(Guandú) adaptation to acid soils.

   Twenty-one (21) different varieties of guandú (Pidgeon pea) are under evaluation at Calabacito in acid soils. Research is a collaboration of IDIAP/Rutgers.

4. Adaptation of sorghum to acid soils.

   Twenty-two (22) varieties of sorghum are under evaluation at Calabacito in acid soils. Research is a collaborative effort between IDIAP/Rutgers.

5. Phosphorus management for maize crops in acid soils.

   Three different forms of phosphorus application to corn crops var. Across are being tested. This research is a combination of forms X dosis and is being conducted at Calabacito in collaboration between IDIAP/Rutgers.

6. Liming in Sugar Cane in Acid Soils.

   This is a long term experiment and this is the 8th trial. The effect of liming on yield and chemical changes of the soil across the perfil are under evaluation in sugar cane fields. The collaboration from IDIAP/Rutgers has been implemented for the last phases of this research.

7. Liming and Fertilization of Pineapples in Acid Soils.

   Five dosis of liming X 5 levels of complete fertilizer are being studied in a factorial type plots

research with 4 replications. The experiment is set up at MIDA in Lola de Las Palmas. This is a collaborative effort IDIAP/MIDA/Rutgers.

Other experimental activities:

8. Fertilization in Cassava.

   Different levels of N-P-K are being studied in a factorial incomplete (15 treatments) with 4 replications. The principal investigator is Ing. José Antonio Aguilar in collaboration between IDIAP/Rutgers in Llanos de Ocú.

9. Fixation of Phosphorus in acid soils in Panama.

   This research is being conducted in twenty-one (21) soils in Panama (Benchmark soils). The fixation of phosphorus is determined following 2 methodologies, 1) Fox y Kamprath and 2) Díaz-Romen y Hunter. The principal investigator is Lic. Pedro González.

G. Other Activities

Collaboration with other specialist of the Rutgers ATD team. Visits to observe experiments conducted by Dr. Mark Gaskell in volcanic soils of Chiriquí high lands. The Soils Specialist suggested that an experiment should be conducted to study the management of phosphorus in onion crops in volcanic soils. It was suggested to Dr. Pedro Argel in

addition, that the fertilization experiments conducted with Andropogon Gayanus and Stylosanthes be continued one more year to gain more information about the residual effect of phosphorus fertilization.

IV. ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL RESEARCH

Dr. Carlos A. Neyra

During this quarter, and for the remainder of 1985, the specialist in Agricultural Research Management and Administration carried out activities according to the following goals:

A. To assist IDIAP in the formulation of institutional objectives, strategies and priorities of agricultural research.

B. To coordinate, in country, the technical Assistance provided by Rutgers University to the ATD proyect in Panama.

Activities and achievements in the two components (A and B), mentioned above, are detailed in this report.

A. Goal: "To assist IDIAP in the formulation of institutional objectives, strategies and priorities of agricultural research".

Activities

1. During this quarter the specialist in Agricultural Research Management and Administration continued working as a member and advisor of the Committee appointed to elaborate the objectives and strategies of IDIAP for the next five years,

1986 to 1990.

2. At the end of this quarter, the Committee presented a document to the General Director, entitled "Final Report: Objectives, Projections and strategies for 1986-1990".

3. For the preparation of the final report the committee held several meetings with Administrative personnel and researchers at the different regions as detailed below:

Eastern Region

Dr. Carlos Morán, Regional Director

Dr. Enrique Andrade, Sociologist

Ing.Fabio Garibaldo, Supervisor(Animal Sciences)

Ing.Edmundo De León, Supervisor (Agronomy)

Lic.Pastor Domínguez, Economist

Lic. Giomara Ross, Sociologist

Central Region

Ing. Rolando Sánchez Díez, Regional Director

Ing. Benjamín Name, Soils Scientist

Ing. Olmedo Duque, Supervisor (Animal Sciences)

Ing. Lucas A. Tasón, Agronomist

Lic. María de Name, Administration

Dr. Alvaro Cordero, Soils Specialist, Rutgers/ IDIAP

.../

Western Region

Dr. Santiago Ríos, National Director(Animal Sciences)

Ing.Omar Chavarría, Regional Director

Ing.Román Araúz, Supervisor (Agronomy)

Ing.Carlos Ortega, Supervisor(Animal Sciences)

Dr. Jorge Gómez, Administrator Exp. Sta. Gualaca

Dr. Pedro Argel, Pastures Specialist,Rutgers/IDIAP

Ing.Leonardo Marcelino, Agronomist (Progreso)

Ing.Delia Jiménez, Agronomist (Alanje)

Ing. Miguel Acosta, Agronomist (Caisán)

4. Through this studies, visits to the different Regional Centers and meetings with research staff, we could conclude that in spite of IDIAP's recent creation (10 years), the administrative organization and research capacity show an acceptable degree of development characterized by:

- Operative descentralization and national coverage.
- Relative Autonomy
- Broad coverage of commodities and research disciplines.
- Availability of technical/scientific staff with advanced training.
- Effective contact with farmers/producers through Farm research.

This appreciation allow to conclude that IDIAP possess the basic functional organizational structure and complementary ingredients for the implementation of research strategies. However, I am also of the opinion that they should implement a component that allows a continuous improvement of the administrative and management capacity to guarantee the effective concentration of structural components; economic and technical resources and policies of institutional operation to facilitate the generation and transfer of technologies.

B. Goal: "To coordinate, in country, the technical Assistance provided by Rutgers University to the ATD project in Panama".

Activities

1. The specialist in Agricultural Research Administration and Management used about 50 percent of effective time in activities related to Project Coordination.
2. This coordination activities can be grouped as follows:
   a. To keep the record of activities and reports of each member of the Rutgers Technical Assistance team.

b. Participate and assist in the coordination of visits to Panama by Rutgers faculty as part of the backstopping efforts to the ATD project.

- Coordination of activities related to the visit made by Dr. Robert Tate, Soils and Crops Dept., Cook College, Rutgers University.
- The activities of Dr. Tate included visits with: 1) Administrators and research staff of IDIAP in Panama, Santiago and Chiriquí; 2) Soils laboratory in Divisa; 3) Agricultural sector staff of USAID/Panama. In addition, Dr. Tate held specific meetings with staff of the National Soils Program of IDIAP for general discussions on planning of a National Soils Program. He also discussed with Dr. Alvaro Cordero about the contents of his plan of work as Soils Fertility and Management specialist under the ATD program.

c. Review and editing, in Spanish and English, of the quarterly reports and work plans prepared by the Technical Assistance team.

- Preparation of Report No. 12 covering April

to June, 1985.

d. Liasson person between Rutgers, IDIAP and USAID/Panama.

- Dr. Alvaro Cordero was incorporated as of July 1, 1985 as the Soil Fertility and Management Specialist to the ATD program assigned to the Central Region (Santiago, Veraguas). He was officially presented to the Administration of IDIAP and USAID/Panamá before proceeding to Santiago. Dr. Cordero was assigned a pick-up Ford Ranger for his work.
- Working trip to Chiriquí for visits and field discussions on the different activities conducted by IDIAP as part of the ATD project. This trip was jointly scheduled with Mr. Ron Levin,Mission Director of USAID/Panama, Ing. Ezequiel Espinosa, IDIAP's General Director and other officers. Other participants included Drs. Mark Gaskell and Pedro Argel, members of the Rutgers Technical Assistance team located in Chiriquí.

e. Explore new lines of interinstitutional cooperation between IDIAP and Rutgers as well as making recomendations for future projections and Technical Assistance needs in Panama.

- Contacts were initiated for a working visit to Rutgers University (New Brunswick) by Mr. Ron Levin (USAID/Panama) and Ing. Ezequiel Espinosa (IDIAP) to take place in mid October as part of the International Horizons Week celebrations and Rutgers.

C. Other Activities

- Coordination of a visit to IDIAP by Dr. Tom Dykes, coordinator of the Biotechnology International Network at Colorado State University, Fort Collins. This is an AID funded project. IDIAP was included as a member of the network and Ing. Susana Pons, leader of the Tissue Culture Lab. at IDIAP, was invitated to participate in a Workshop to be held in late October at Colorado State University/IPBNET.
- Coordinator and panel member of a workshop on "Biotechnology and Agricultural Development" organized as part of the celebrations for the X aniversary of IDIAP. Special invitated speaker was Dr. William Roca, Director of the Biotechnology Unit at CIAT, Colombia.

  Lectures scheduled were:

  1. "Biotechnology: Projections at IDIAP"
     by: Susana Pons, IDIAP

2. "The Biotechnology Program at CIAT"
   by: William Roca, CIAT
3. "Biotechnology for Agriculture and the Environment"
   by: Carlos A. Neyra, Rutgers University