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

This report is being sub-divided into four main sections following the reports from each of the four Specialists, components of the Rutgers Technical Assistance Team. This sections are: I Tropical Pastures Specialists, Dr. Pedro Argel; II. General Agronomy Specialist, Dr. Mark Gaskell; III. Animal Production Specialist, Dr. Alfredo Serrano and IV. Agricultural Research Administration Specialist, Dr. Carlos A. Neyra. A fifth team member, Dr. Alvaro Cordero, an Specialist in Soil Management will join the Rutgers TA team in Panama as of July 1, 1985.

A handwritten signature in black ink, appearing to read 'C. Neyra', is written over a horizontal line.

Dr. Carlos A. Neyra
Project Coordinator,
ATD in Panama

ATD-PANAMA PROJECT
CONTRACT No.525-0180-C-00-2015
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ACTIVITIES BY SPECIALIST

I. TROPICAL PASTURES SPECIALIST Dr. Pedro Argel

1. Background

A forage research program that emphasizes species adaptation implies a continual observation and evaluation over a range of climatic and soil conditions. From a large number of species introduced in 1983, a smaller group of ecotypes have been selected and some of these will

be involved for the first time in Panama to animal grazing evaluation. Evaluating a species with the animal present permits the confirmation of good or bad species characteristics and enables the evaluation of productivity factors such as persistence, quality and management. Nevertheless, given the genetic variability of tropical species, the research process cannot neglect the systematic and continued evaluation of current and newly introduced species that show productive potential. In this way, the natural variability of the country with its different ecological niches, requires that the evaluation process be continual and that it is adjusted to the different soils and microclimates present in the tropics. The advances seen in the program of selection, establishment, and management of forage germplasm are included in the following.

2. Germplasm

The best means of measuring differences due to the different ecosystems is with the same plant. The experiments with a high number of species - Type A Experiments (ERA) - in Sona, Los Santos, and Calabacito passed once again through a dry cycle (summer) and entered the normal rainy period. The Calabacito study ended its normal evaluation period in June/1985, but the others will continue until November. Of the 31

legumes established in Calabacito, the following are recommended for further evaluation. First, the Centrosema macrocarpum 5434 and 5062 for general vigor, tolerance to the drought and resistance to insects and diseases. In order of importance but at a lower scale of productivity, the Stylosanthes guianensis 184 and S. capitata 10280, the species Centrosema sp. 5112 and 5278, S. guianensis 136 and Pueria phaseoloides 9900 (kudzu), have a relatively low potential primarily due to their low productivity during the dry period. In summary, eight legumes have been selected from Calabacito as promising; of these the C. macrocarpum 5062, S. capitata 10280, S. guianensis 184, and kudzu are included in a grazing trial that is now being established.

Of the nine grasses initially established for evaluation, the Brachiaria dictyoneura 6133 and Andropogon gayanus 621 and 6200 stand out for their vigor, tolerance to drought and general health, followed by, B. humidicola 679. These species are also being included in the grazing trial. Other grasses such as B. decumbens 606, faragua, B. radicans, D. swazilandensis and B. decumbens, have persisted but show vigor or chlorosis problems in experimental conditions.

2.1. Brachiarias

Two or three ecotypes of the genus Brachiaria are well established in Panama, but the distribution range is limited due to soil or tolerance to Aenolamia spp.* In 1983, 49 ecotypes of Brachiaria were introduced from CIAT, of which 23 survived the transplant in Gualaca. The ecotypes are now established for evaluation at Gualaca, Finca Chiriqui, and Calabacito, and July 3 they were established in Sona. The salivero insect has only appeared with severity at Finca Chiriqui and in evaluations to date the B. humidicola 6707 shows good tolerance to the pest. Other ecotypes such as B. decumbens 6132, 6131 and B. ruziziensis 6291, 654, 6419 and 655 have shown high susceptibility to the pest. At

*Aenolamia spp.= Salivero

Calabacito the attacks of salivero have been moderate and all of the Brachiarias have developed normally. The insect tends to appear periodically in specific areas, with populations fluctuating from moderate to high, and the fluctuation seems to depend on soil and environmental factors. Forage species in Gualaca for example, never are damaged by the insect but the same species at Chiriqui, 20 km. from Gualaca are damaged severely year after year by the insect. The most notable difference between the two sites is precipitation and soil type, but it would be premature to associate the damage with only these factors. The natural variability in the incidence of the pest justifies the multilocation testing of the different Brachiaria ecotypes and the other forage species. In the past, the evaluations have been concentrated only in Gualaca, that as previously mentioned, has an ecosystem which is perhaps less severe and more favorable for the growth of the majority of tropical forage species.

Two ecotypes have been shown to be promising to date for their drought tolerance and other favorable agronomic characteristics. These are, the B. dictyoneura 6133 and the B. humidicola 6369 (initially classified as dictyoneura); the first is already included in the grazing experiment in Calabacito and moderate scale seed production of both is planned.

2.2. Type B Regional Experiments (ERB)

This type of experiment is a continuation of the adaptation experiments Type A (ERA) established in 1983/84 in various parts of the country. An existing ERB established in Los Santos that was replanted during this reporting period; another ERB was planned and established in Sona based on the ERA observations there. The land is prepared and seed of the following species has been turned over to IDIAP: S. guianensis CIAT 1280, 184, 191, and 136; S. capitata CIAT 10280; P. phaseoloides (Kudzu); D. ovalifolium CIAT 350; C. macrocarpum CIAT 5062; Centrosema sp. CIAT 5278; B. dictyoneura CIAT 6133,

B. humidicola CIAT 6369, B. decumbens CIAT 606; A. gayanus CIAT 621 and 6200 and H. rufa (faragua). These 15 chosen species come from 43 that were established in the same area in a ERA in 1983, and they are the most noteworthy; the legume Arachis pintoii CIAT 17434 has also been included because although not included in the ERA, is seen as potentially promising for the area.

During the current rainy season, another ERB is planned for Rio Hato - a drier ecosystem with sandier soils - in collaboration with INA in Divisa. Seed of the following species was delivered during the reporting period to Ing. Metodio Rodriguez of the Agronomy Faculty: C. macrocarpum CIAT 5434, 5062 and 5065; C. pubescens CIAT 5126 and 5189; C. sp. 5112; P. phaseoloides CIAT 9900; S. capitata CIAT 10280; S. macrocephala CIAT 1643 and 2133; S. guianensis CIAT 136 and 184; S. scabra CIAT 1047; S. hamata CIAT 147 and 118; S. sympodialis CIAT 1044 and N. wightii CIAT 216; A. gayanus CIAT 621 and 6200; B. decumbens CIAT 606; B. humidicola CIAT 679; B. dictyoneura CIAT 6133; P. maximum CIAT 604 and C. ciliaris CIAT 678. This experiment will also include local grass ecotypes.

3. Seed Multiplication

Seed production of promising forage species, for experimental and commercial use has been a complement to the evaluation program. Observations have been made of the most favorable sites for seed production from a climatic standpoint. The Azuero area seem to be the most appropriate because of favorable soils and rainfall distribution. Calabacito is also a promising site but the chance of rain during seed harvest there make it less favorable. This same problem exists in Chiriqui which means that seed would not be produced there except that seed production requires the infrastructure that Gualaca has for drying and seed processing.

Unfortunately IDIAP does not have a livestock research station in the Azuero region, and for this reason the seed production work is concentrated at the Calabacito station. The selected species are those that have shown themselves most promising in the adaptation and agronomy evaluations. Land is being prepared for planting the following: S. guianensis CIAT 184, C. macrocarpum CIAT 5062, S. capitata "Capica", C. sp. 5112 and 5278, B. decumbens, B. dictyoneura CIAT 6133, B. humidicola CIAT 6369 and A. gayanus CIAT 621. A specific site has been selected and the individual plots range from 1,000 to 10,000 m². Weeding and general maintenance have continued in the plots of C. macrocarpum CIAT 5065 and kudzu at Gualaca, and because the regrowth of S. guianensis CIAT 136 was not good following seed production in January/1985, that plot has been eliminated. A study, is now underway with B. decumbens with the following treatments: two pile sizes (0.40 and 0.80 m.) and four threshing times (0,2,4, and 6 days). The objective is to study the effect of these factors on seed quality of the species based on the observation from previous harvests that there is an association between temperature in the seed pile and seed quality.

4. Establishment and Management

An experiment on weed control during kudzu pasture establishment was conducted in 1984; the results will soon be published in the Bulletin of Tropical Pastures of CIAT. From that experience, a new experiment was designed and established in Gualaca June 3-4. The experiment compares different herbicides in combination with mechanical control. The compounds used were oxyfluorfen, alachlor, metachlor acifluorfen, fluazifop-butyl and pendimentamine in varying dosis and combination. The first evaluation has confirmed the selectivity and the control with oxyfluorfen (0.50 kg. ai/ha.) and of alachlor (2.24 kg. ai./ha.) preemergence and of acifluorfen (0.50 kg./ ai./ha.) postemergence. Manual weedings are now being done and evaluation will continue for 90 days.

Application of the herbicide picloran + 2,4-D amine at 1.5% plus diesel, made the 20th of March (dry season) on regrowth of the brush Chumico (Cruatella americana) Guayabo (Psidium sp.) and Portobelillo (Casearia javitensis), have confirmed the tolerance to chemical control of the first two and the susceptibility of the third. A parallel experiment with Guayabo has shown 50% regrowth after 90 days with wipe on application. A new experiment has been planned to be established in the near future with Chumico and Guayabo with the herbicide dicamba + 2,4-D and Velpar included as treatments.

5. Pasture Evaluation

Significant progress has been made in finishing the planting of the 27 ha. that comprise the grazing trials experiments (called C and D) in Gualaca. Nearly all of the pastures are established and recent efforts have been made to distribute the tubing for watering tanks and electric fence wire. Grazing will begin in the next few months, and appropriate animals are being acquired. The experiment on persistence under grazing (Type C) of 3.6 ha. in cooperation with the Agronomy Faculty is also completely established. Grazing has not been initiated because of lack of water because funds to buy the tubing have not arrived as expected. It was proposed to transport the water to the plots daily in the meanwhile so as not to miss the opportunity to begin these grazing trials. It is a pity to have delays of this kind when the more critical parts - the establishment and fence construction - have been successfully completed.

A new grazing experiment (Type D) is being established at Calabacito. The species to evaluate are: Faragua and A. gayanus CIAT 621 associated with S. capitata "Capica"; Brachiaria dictyoneura CIAT 6133 and B. humidicola associated with kudzu and A. gayanus CIAT 621 associated with C. macrocarpum CIAT 5062 and S. guianensis CIAT 184. An alternate grazing system with two carrying capacities in pastures of 1.5 has. each will

be utilized. All of the land has been prepared and the plantings are now being done. The parameters to be measured are weight gain, changes in botanical composition and soil nutrient changes over time.

At the end of 1984 a plot of S. capitata "Capica" associated with Digitaria decumbens was established for weaning of calves of milking cows. This project was initiated in collaboration with Dr. Serrano but due to the dry weather at establishment the Capica did not do well. Nevertheless, during the current year the growth and vigor of both species has been surprising and a good association has developed. A methodology for evaluating the plot has been discussed with Ing. E. - Arosemena and two groups of ten calves will be selected soon to initiate the observations. The weaning of calves of milking cows is perhaps one of the most critical near term aspects of a program to improve the dual purpose farms that predominate in Panama. The problem is primarily one of adequate feed.

6. Training and Conferences

A workshop was organized at Gualaca in collaboration with Dr. Carlos Lascano and CIAT July 17 to 19 cover methods of pasture sampling. A total of 12 participants attended including two from the Agronomy Faculty. The seminar was theoretical/practical and consisted of evaluations of sampling methods: double sampling, stratified sampling, systematic sampling, and the Dry Weight Rank method. This is the first workshop of this type that CIAT has supported and it served as a basis for the development of future similar events. The quality of the training was quite good and the commentary was very favorable. After the seminar, Dr. Lascano also had the opportunity to visit forage experiments underway in Chiriqui and the central provinces.

The VIII Meeting of the Panamanian Association of Animal Production was held in David on May 2-4. Dr. Argel presented a

paper entitled "Perspectives for Seed Production of Tropical Forage Species in Panama". Other papers were presented in collaboration with IDIAP researchers. One of these was titled "Agronomic Study of 21 Ecotypes of Brachiarias During Establishment", and was presented by Ing. David Urriola; the other paper entitled "Weed Control with Pre and Post-emergent Herbicides in the Establishment of the Forage Legume Tropical Kudzu (Pueria phaseoloides)" and was presented by Ing. Bolivar Pinzon. Both papers were well received and discussed by the audience.

The III General Meeting of the International Network for Tropical Pasture Evaluation (RIEPT) will be held October 21-24 at CIAT in Cali, Colombia. Panama is a collaborating member of the RIEPT and since 1983 there has been close collaboration with CIAT. Ten summaries of papers belonging to or in collaboration with the network were sent during the present reporting period to be presented in October. The titles of these papers and the principal authors are the following:

1. Evaluation of the persistence and meat production of various associations of tropical forage species. Norberto Pitty (Agronomy Faculty).
2. Adaptation of forage grasses and legumes in Calabacito. Nector Aranda (IDIAP-Calabacito)
3. Periodic yield of 16 Leucaena ecotypes. Gregorio Gonzalez (INA-Divisa)
4. A study of 21 Brachiaria ecotypes during the establishment period. David Urriola (IDIAP, Gualaca)
5. Productivity of mixed pastures in weight gain terms. Carlos Ortega (IDIAP - Gualaca)

6. Evaluation of the persistence of mixed pastures under grazing. Carlos Ortega (IDIAP - Gualaca)
7. Response of A. gayanus and S. capitata alone and associated to P205, K20, MgO, and S during establishment. Nestor Aranda (IDIAP - Calabacito)
8. Adaptation of grasses and legumes in the Bongo, Los Santos (Panama). Olmedo Duque (IDIAP - Los Santos)
9. Establishment and production of forage grasses and legumes in El Ejido, Los Santos (Panama). Olmedo Duque (IDIAP - Los Santos)
10. Adaptation of forage grasses and legumes in the Sur of Sona, Veraguas, Panama. Esteban Arosemena (IDIAP - Santiago).

The summaries will be presented at CIAT by the coordinator of the RIEPT in Panama, Ing. Carlos Ortega of IDIAP and are a clear example of the gains in recent years or the close association with CIAT. Dr. Argel was active in the carrying out of each of these studies and in the preparation and submission of the summaries.

Future Plans

Less emphasis will be directed in the near future to the introduction and preliminary evaluation of a large number of forage species. More attention will be directed toward observations of productivity instead of adaptation and seed production of promising species. Part of the material selected to date will be put in grazing trials at Gualaca, the Agronomy Faculty, and Calabacito. These studies have greater short term priority and the results will serve to balance the introduced germplasm and to define the genera or

ecotypes of future economic importance. Once that a species has shown its worth under grazing, it is worth studying in greater detail the agronomic characteristics, seed production and fertility requirements. More work in the future will be guided by these concepts.

II. GENERAL AGRONOMY SPECIALIST Dr. Mark Gaskell

Background

The work emphasis of the General Agronomist is concentrated in two of IDIAF's priority geographic research areas. Dr. Gaskell is working with the agronomic problems of rainy season onion production in the highlands of Bugaba District (Cerro Punta and Boquete) and with agronomic management problems of dry beans or maize (depending on the season) in the Caisan area of Renacimiento District.

Onion Research

Experiments were harvested during April in Boquete that were designed to compare yield of commercial onion varieties when grown during the traditional period with that of the rainy season harvest. These results (Figures 1 and 2) indicate several important points. First, the potential yield in the area during the traditional harvest is quite high with good management. The 1700 qq./ha. produced on the Cheva Farm would be roughly three-fold that of average yield commonly quoted for the area. Secondly, the varieties that are producing well during the traditional harvest period - Granex 33, Yellow Granex, Henry's Special - are the same varieties that yielded well in rainy season harvests (see Reports 9, 10). It is commonly thought that the red bulbed varieties (Tropicana, Red Granex, Burgundy, etc.) have more tolerance to the rainy weather. These varieties often appear better - less leaf yellowing, etc. - but these experiments are showing that the red varieties do not produce particularly well and are very slow to mature. In contrast, the Granex 33 often shows more leaf yellowing in rainy weather but matures early, uniformly, and produces very good yields.

There is no reason for a grower to select a red bulbed variety unless he has a contract for a price premium. Seed of the Granex 33 is somewhat more costly however, but all of the experimental results and experience during 1984/85 would indicate that it is a worthwhile investment.

A preliminary economic comparison can now be made of the predominant onion production alternatives available to growers in the highlands (Table 1). These figures are based on measured experimental and commercial yields and although are based on one season (1984/85) of data, are not unrepresentative of the area.

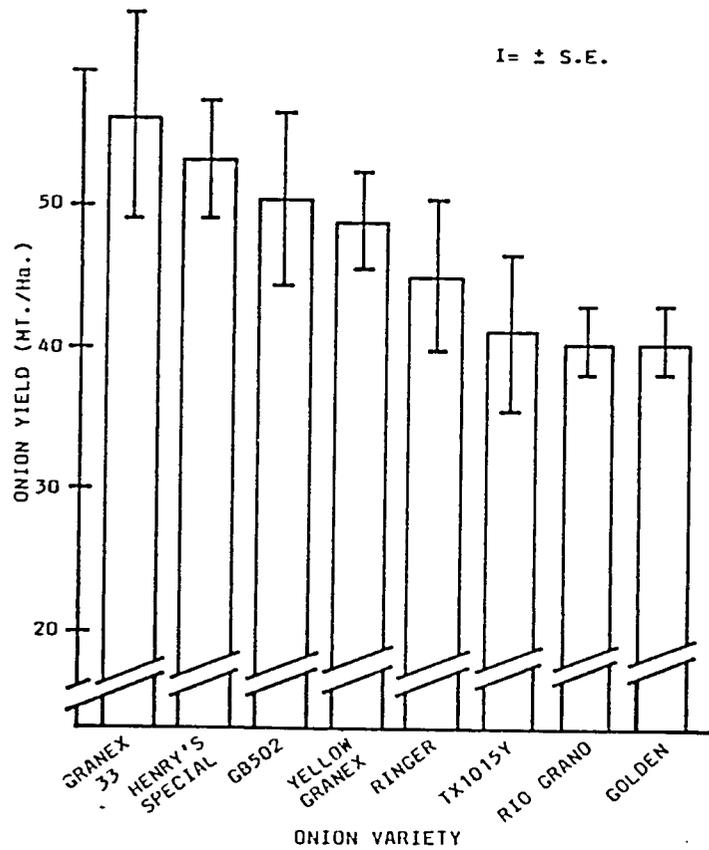


Figure 1. Commercial yield of eight onion varieties harvested in the dry season. Tierras Del Norte Farm. Boquete, 1985.

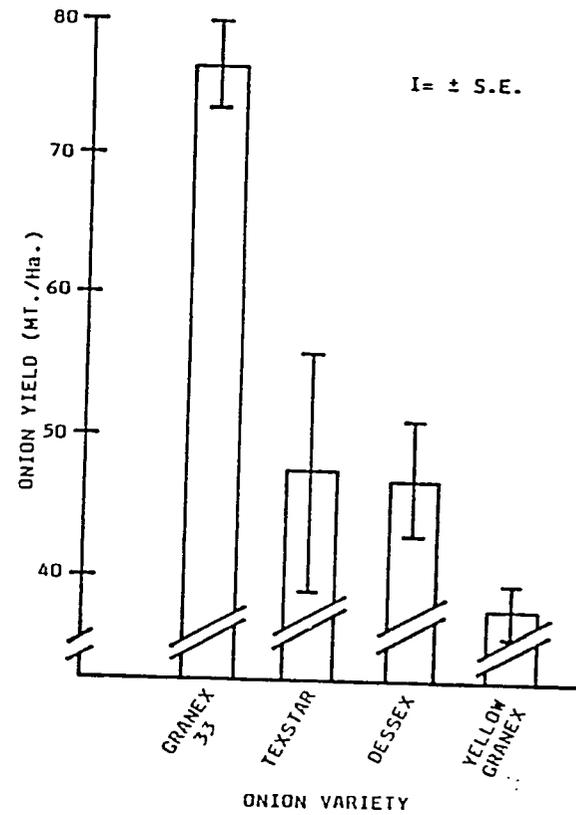


Figure 2. Commercial yield of four onion varieties harvested in the dry season. Cheva Farm. Boquete, 1985.

Table 1. Economic comparison of onion production alternatives in the highlands of Panama.

HARVEST PERIOD	YIELD POTENTIAL (MT./ha.)	PRICE (\$/MT.)	GROSS RETURN (\$/ha.)	PRODUCTION COSTS (\$/ha.)	RETURN (\$/ha.)
DRY SEASON (Potential)	56.8*	440	24,992	4500	20,492
DRY SEASON (Average)	27.0	440	11,800	5000	6,880
RAINY SEASON Alt 1	45.5	440	20,020	5300	14,720

* Means of replicated samples from commercial production fields under high management level - 1984/85. Yields of 79.5 MT./ha, have been recorded in replicated samples from commercial fields.

These figures indicate that production costs per MT varies from \$56.60 to \$79.00 under high management conditions. Imported onions in 1984 cost \$242.00 per MT (from Holland) placed in refrigerators in Panama City. Thus, import substitution is not only very feasible in the case of onions but also desirable. What is needed is to raise the production efficiency of Panamanian growers. For the vast majority of highland growers, yields fall far short of those indicated here and costs are higher.

These figures also show that although profit potential at this time is lower for rainy season onions than for summer onions, but considerable profit margin still exists for rainy season production. The other advantage in rainy season production is the security of a market (if onions are not imported). Many traditional summer season growers are harvesting at a time that the market is glutted with onions and prices are very low. At the end of the traditional summer harvest period there is no market at all.

The Agricultural Marketing Institute (IMA) has announced that they will not be guaranteeing the purchase of lowlands onions in 1986. This is a pronounced turn toward a more free market situation and will improve the market somewhat for highlands growers who have historically been more efficient and come into the market earlier.

New experiments were established during April, May and June to continue evaluating rainy season production alternatives. A trial of 26 commercial varieties - including two new, early varieties from California and six new Australian varieties was planted in Boquete in April for transplanting in June. A similar varietal

evaluation was planted on the Martinez farm in Alto Trivaldo above Volcan in June. There are fewer farms with irrigation facilities in the onion producing areas on the Cerro Punta side of the highlands. Thus, irrigated seedbeds established during the dry season would have much wider acceptance in the Boquete area.

Other experiments established during the period included two experiments - one in Boquete and one in Bambito - to again evaluate different planting densities under a plastic seedbed cover and in the open under on-farm conditions. Some modifications were also made in the seedbed cover which was designed during the 1984/85 season. Experiments during 1984 showed a marked benefit to covering seedbeds (Figure 3) and it is important to confirm those results and to evaluate the seedbed covers on a wider range of farms. Wind has been more of a problem this season than last. Even though it is widely felt that the rainy season is not windy, there are sufficient gusty days at most sites in the highlands for it to present a problem in plastic seedbed cover use. The seedbed cover is a valuable seedbed management practice but growers need to select a protected site or use planted windbreaks to use plastic covers.

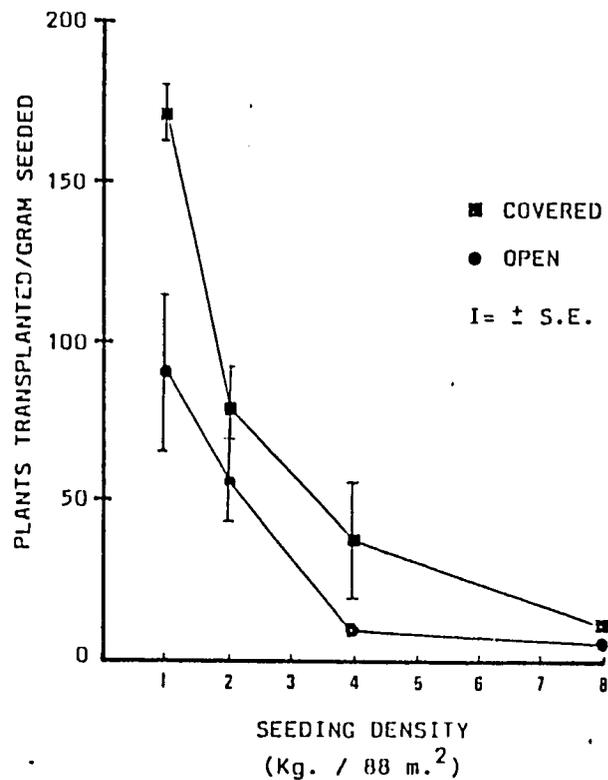


Figure 3. Rainy season onion seedling survival following four seeding densities in the open and under plastic, Marciacq Farm. Boquete, 1984.

This experience also illustrates the value of on-farm validation of a new technology which in this case originated on an experiment station. The experiment station is much more protected than the typical farm in the highlands and thus, a technology such as the plastic seedbed cover could appear more valuable than it is or could fail miserably under on-farm conditions if it is not evaluated and confirmed first under farm conditions.

New experiments have been established on the Experiment Station in Cerro Punta and on a farm in Boquete to determine the economic onion response to lime application and the interaction with liming and chicken manure/ rice hull application. Following several reports of onion problems in 1984/85 a review of soil laboratory analysis results for Cerro Punta and Boquete was made and growers were interviewed about fertilization and liming practices. As a result of this review, what appears to be a fairly widespread soil acidity problem was encountered. It seems that many - perhaps the majority of growers were not accustomed to apply lime probably because potatoes dominated production in the highlands for so many years and potatoes are tolerant of acid soils. More recently with a widespread shift out of potatoes to onions and other less tolerant vegetables the pH problem is surfacing. It is complicated by several factors including:

1. A history of very high levels of nitrogen fertilizer application and the accompanying tendency to acidify,
2. Relatively high levels of manure/ rice hull application and,
3. Uniformly high rainfall.

These experiments will evaluate the soil pH changes over time and the onion yield response to differing levels of lime, manure/rice hull and in the case of Boquete, coffee pulp application. Application of chicken manure/rice hull mixtures brought from chicken farms in the eastern provinces is common. The manure/hull combination costs \$1.35/ 35 kg. bag and application rates of 2 MT per hectare are common. Thus, it is not unusual that growers are spending \$500 /ha./yr. on manure/hull application. It is important to quantify the value of the material in the short term and compare it to other, cheaper more locally available material such as coffee pulp.

Considerable rainy season onion production is in the field during the 1985 rainy season. This is likely the result of commitments by IMA to not import prior to October coupled with a clear rainy season onion management technology which is emerging as a result of the research and extension effort in the highlands and the effect it has had on grower confidence.

An additional alternative for rainy season production is being tried by some growers during the 1984/85 growing season. This alternative uses small bulbs brought from the central provinces to be planted at the beginning of the rainy season in the

highlands. This alternative has not previously been included in the onion research program because growers are dependent upon planting bulbs for which they have no control of the production and the production system is not clearly developed at present. A considerable area has been planted to bulbs this season nevertheless and an effort is underway to monitor production on commercial fields. Late in the rainy season, an experiment is planned to investigate the possibility of producing bulbs on-farm under highlands conditions.

Work has been continuing on two of the on-farm solar onion dryers. It is hoped that a means can be found to improve the curing process for bulbs harvested during the rainy season. Those growers who now grow onions during the rainy season are accustomed to putting the wet onions directly into storage sheds and those onions not sold store poorly and rot quickly. With the assistance of Rutgers University agricultural engineers, two types of onion dryers have been built (see Reports 9 and 10) and are in different stages of on farm evaluation.

The most promising dryer design for near term use is a modified wood frame plastic covered box with venting for air circulation. Temperature and relative humidity are being monitored in this dryer and in the traditional storage shed on a 24 hour basis. Preliminary results (Figure 4) indicate considerable temperature gain and associated relative humidity reduction on a typical rainy season day on the Espinosa farm in Alto Bambito. Beginning between 7 AM and 8 AM, temperature in the dryer rises to eventually pass 26 C. to that of the traditional storage shed curing method and relative humidity falls to 50%. The curing capability of the dryer remains good until between 3 or 4 PM. It is relatively unusual to have rainy mornings in the highlands during the rainy season but on those days with rain in the AM, heating is less. The dryer has been recently modified to improve heating (and drying) beyond that indicated in Figure 4 and data collection is continuing.

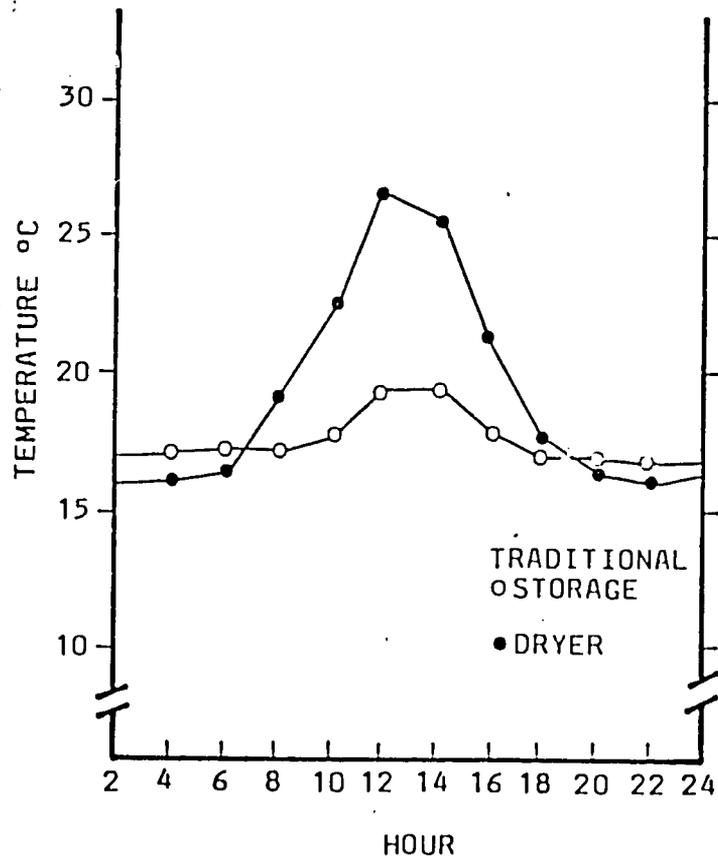
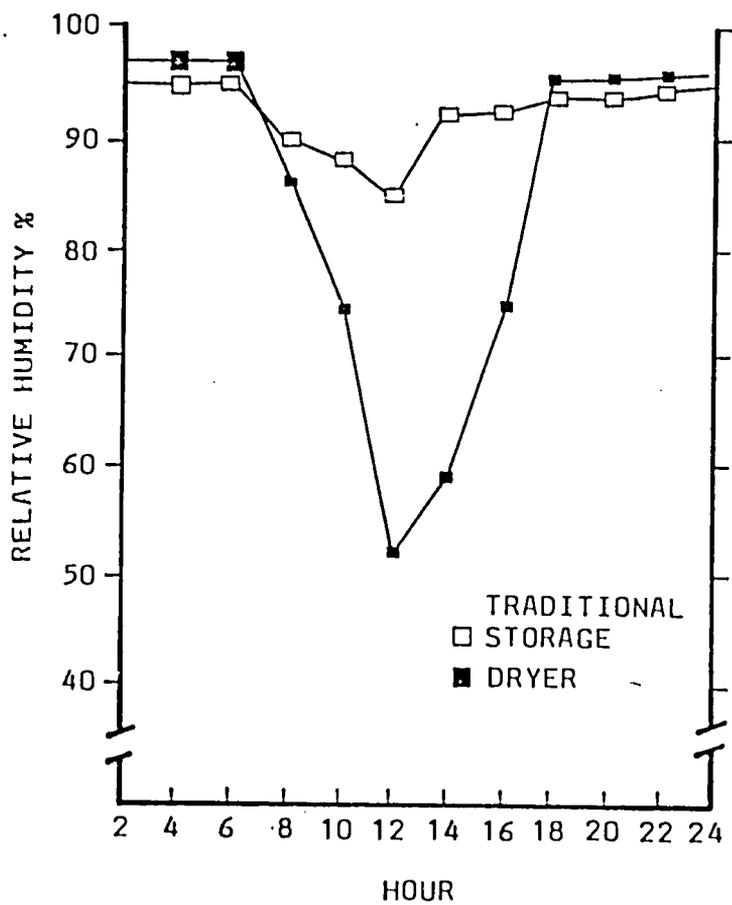


Figure 4. Diurnal temperature/relative humidity in traditional storage curing and in experimental solar onion dryer. Espinosa Farm. Cerro Punta, 1985.

The larger storage shed dryer with an attached solar collector is being modified considerably to improve air flow and provide better heating. A photovoltaic fan system is being designed as an option for improved air flow.

In April, Dr. Gaskell prepared and presented a seminar and workshop on research data management and statistical analysis using a microcomputer for the staff of IDIAP's experiment station in Cerro Punta. IDIAP researchers Roberto Rodriguez, Leslie Espinosa, Franklin Atencio, and Campos Serrano participated.

Maize Research - Caisan

Planned maize fertility experiments to follow on the results of 1984 in Caisan were not planted in April. There were some problems with the availability of inputs and supplies to plant the experiments but there were also some coordinating problems in the area. IDIAP regional coordinators are working to clarify the management problems in the area prior to dry bean planting in October/November.

Other

In late April, Dr. Gaskell attended the 31st Annual Meeting of the Central American Food Crop Improvement Cooperative Program (FCCMCA) in San Pedro Sula, Honduras. He presented a paper at the Dry Bean Table entitled "Agronomic and Economic Response of Dry Beans to Fertilization in Caisan, Panama" which he co-authored with IDIAP researchers Ruben DeGracia and Miguel Acosta. He presented a paper at the Vegetables Table entitled "Improving Rainy Season Onion Production in The Highlands of Panama" which he co-authored with IDIAP researcher Campos Serrano. IDIAP researcher Jose Roman Arauz also presented a paper at the Maiz Table entitled "Management of a Maiz-Oriented On-Farm Research Program in Western Panama" which Dr. Gaskell co-authored.

III. ANIMAL PRODUCTION SPECIALIST Dr. Alfredo Serrano

(Translated from the Spanish by: Dr. Carlos A. Neyra)

I. General Considerations

The research activities in Animal Production were scarce during the second quarter of 1985. This was due to a very dry summer and lack of economic resources to continue with the experiments underway. The specialist in Animal Production, organized two field practical sessions on diagnosis of mastitis and a workshop-seminar on early diagnosis of pregnancy in bovines and identification of reproductive disorders. These activities were conducted in response to a request made by livestock technicians from IDIAP and MIDA. Also, training was provided on radioimmunoanalysis techniques to laboratory staff involved in the FAO-IDIAP-UNAP project. Technical assistance was given to collaborating farmers in the CIID-IDIAP project at Los Santos and eastern region (Chepo and Corporacion Bayano).

Dr. Alfredo Serrano prepared his final report of activities in Spanish and offered a seminar on Accomplishments and Projections of Livestock Research in the Central Provinces of Panama.

II. Specific Areas of Activity

1. Diagnostic and prevention of diseases of economical importance. Incidence and causes determining slaughter of fertile cows.

Background

In 1984, it was found that 73.5% of the cows slaughtered in Santiago (Veraguas) and David (Chiriquí) were in different stages of pregnancy. This incidence dropped to 55% during the first quarter of 1985 and in this quarter increased again to 65%.

In one way or another, the problem exist. A high number of pregnant cows are sacrificed because of lack of comercializa-tion, scarce feed resources (dry season) and high price of sup-plies for herd maintenance and supplementation.

Progress of Activities

The revision of 2,000 reproductive organs were completed in the current quarter. The incidence of pregnant cows slaugh-tered was 65% wich represents an increase of 10% compared to the first quarter of 1985. As in the first quarter, the main anomalies found in slaughtered cows were alterations in ovaries and uterus as a consequence of a long summer (dry season), nu-tritional deficiencies and stress.

A workshop-seminar was offered in the slaughterhouse of Santiago to technical personnel of both IDIAP and MIDA. The methodology used in this research work was communicated.

Future Plans

Expand this research activities to different slaughter-houses throughout the country, in collaboration with MIDA, to start a diagnosis on the prevalence of diseases affecting the production and reproduction of herds dedicated to beef produc-tion.

2. Effect of temporal weaning of calves on the reproductive efficiency of beef and dual purpose cows.

Background

Based on positive results obtained in preliminary experiments at the farm of Mr. Gregorio Villareal and on the Experimental farm at Calabacito, a recomendation was made to Livestock Specialist to introduce temporal weaning of calves as a manage-ment practice to reduce the interval between pregnancies.

Progress of Activities

On April 11, a second experiment was initiated at the farm of Mr. Gregorio Villarreal, using 12 brown Swiss x Zebu cows. Temporary weaning will be practiced daily, after nursing of the calves, for a period of 8 days. The cows will remain with the bulls and will be checked monthly for ovaric activity.

On April 2, 1985 an experiment was initiated at INA on temporal weaning using 28 Zebu cows and 14 dual purpose cows. Temporary weaning was practiced daily, after nursing, for a period of 10 days.

The cows had been checked monthly and was detected that 38% of anestrus cows had reinitiated their estrual cycles.

The experimental initiated at Calabacito was suspended because of the intense drought.

Future Plans

To continue with this series of experiments with collaborating farmers, the Experimental Station at Calabacito and the National Institute of Agriculture (INA).

3. Evaluation of bull fertility and the variations in sperm quality on the Experimental Farm of Calabacito.

On the last check of April 22, the brown swiss bull No.386 produced an sperm of low quality with a total percentage of 50 points (dubious). The bulls No.254 -brown swiss- and 321 Gyr, did not react to the electro eyaculator in the last check. Because of this poor reproductive behavior of this bulls, as a consequence of the extended summer, it was consider necessary to suspend the sampling until the start of the rainy season and improvement of nutrition.

4. Determination of blood level progesterone in dual purpose cows.

Background

A cooperative project with the Biochemistry Dept., of the University of Panama, was initiated to implement the technique of Radioimmunoanalysis for detection of progesterone levels in dual purpose cows. The initial objective of this experiment was to involve IDIAP with the International Network for management of bovine reproduction, with the technical assistance of FAO, through the International Agency of Atomic Energy headquartered at Vienna, Austria.

Training of lab. technicians from the Biochemistry Dept. University of Panama, was conducted with the participation of Dr. Renato Barrera. Samples were taken from 9 cows in different stages of their reproductive cycle. The samples were processed following the procedure of Kit Coat -A- Count (Diagnostic Product Corporation). Pregnant animals showed from 17 to 22 ng progesterone/ml while empty animals or post-partum showed concentrations ranging from 2.6 to 4.0 ng/ml. This values are in agreement with those reported in the literature.

Unfortunately, this project was also discontinued because of lack of funds.

Future Plans

Request economic support to IDIAP in order to continue with this investigation and may be a change of one of the principal investigators, Dr. Renato Barrera who is, again, in charge of the CIID project in the Central provinces.

6. Incidence and etiological diagnosis of bovine mastitis

General Comments

In spite of the urgency to diagnosis and control mastitis in doble purpose cattle, this project had to be suspended due to a lack of economical support and facilities to process milk samples.

About 50 percent of all the projects originally designed by the Animal Production Specialist could not be started or had to be discontinued because of lack of economic resources, laboratory facilities or even human resources. In similar agreements to this where several institutions are involved and agreements of operation and resources from various sources, it becomes necessary that the formalities of Institutional Compro-mise be discussed with enough anticipation to the execution of research activities. In such agreements there must be a clear commitment of each institution and this must be defined according to the resources actually available.

Other Initiatives/Activities

Training

Two field practical sessions were offered on methodology for conducting etiological diagnosis of bovine mastitis. The first event was conducted in the milk farm of Corporacion Bayano, BDA. This event was organized by Tec. Gloria Olave of IDIAP and the Director of the Eastern Region, Inc. Carlos Moran, IDIAP.

The second event was carried out at the instalation of INA, with the assistance of eight (8) profesional technicians from IDIAP, INA and Fomento Lechero.

The Regional Direction of the Central provinces organized a workshop-seminar on early diagnosis of pregnancy and identification of reproductive disorders in cows sacrificed at the slaughterhouse of Santiago. Fifteen profesional from IDIAP, MIDA (Central Region, Cocle y Herrera), INA, Fomento Lechero, Ministerio de Salud y Práctica Privada, took part in this event. The specialist in Animal Production held discussions with the attending participants on the problem of sacrificing pregnant cows, followed by the an study of the methodology to expand this work at the National level. Training was also offered at INA on early diagnosis of pregnancy and causes of anestrus.

Technical Assistance

The Finca Experimental of Arenas was visited and recommendations for a plan on Livestock research, were given.

At the request of the new Director of the Eastern Region of IDIAP, we offered a visit of technical assistance to collaborating farmers in Chepo. Activities here included an study of fertility using 15 bulls of Corporación Bayano. The latter served as training for six technicians from IDIAP, MIDA and Corporación Bayano.

General

The Specialist in Animal Production participated in various meetings with the Director General of IDIAP, Ing. Ezequiel Espinosa, the new Director of the Central Region, Ing. Rolando Sánchez and with the National Director of Livestock, Dr. Santiago Ríos. Dr. Serrano requested to Dr. Santiago Ríos the revision of the Manual of Reproduction written by the Specialist which is being edited and in the process to publication by IDIAP. Several photographs to illustrate different reproductive aspects were included with this manual.

Finally, the specialist in animal production, submitted to the National Director of Livestock/Animal Sciences of IDIAP, a summary of research advances, at IDIAP, to be presented during the next meeting of ALPA to be held in October (1985) in Mejico.

IV. AGRICULTURAL RESEARCH ADMINISTRATION SPECIALIST
Dr. Carlos A. Neyra

General Introduction

During this quarter and throughout 1985 the Agriculture Research Administration Specialist is expected to focus on the following specific activities:

- A. To assist IDIAP in the formulation of institutional objectives, strategies and priorities for agricultural research.
- B. To assist IDIAP in the preparation of Training Plans for staff development.
- C. To assist IDIAP in the identification of research opportunities and development of effective methodologies likely to cause a significant impact on the agricultural sector.
- D. To act as in-country Coordinator of the Technical Assistance provided by Rutgers University to the ATD project in Panama.

Activities and accomplishments on all four components mentioned above (A,B,C,D) are described here in this report.

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

A C T I V I T I E S

1. The Ag. Research Administration Specialist became acquainted with the availability of human, physical and economic resources for the implementation of research programs and activities at IDIAP. Informative documents

were provided by the Administration at the Central and Regional levels. Assessment activities were complemented with on-site visits to Agricultural Experiment Stations and other Research Units of IDIAP.

2. At the initiative of the General Director of IDIAP and the request of the Ag. Research Adm. Spec. a Committee was appointed and charged with the preparation of research objectives and strategies of IDIAP for the 1986-1990 period. The Committee was appointed on April 2 as follows: Lic. Miguel Cuellar, Coordinator, Dr. Santiago Rios, Dr. Gaspar Silvera, Ing. Bernardo Ocaña, Dr. Carlos A. Neyra.
 3. The committee held periodic meetings to define the operational methodologies and evaluation of progress. The committee decided to:
 - 1) use as initial reference several internal and external documents relevant to the charge
 - 2) hold personal interviews with each of the National and Regional Directors of IDIAP and
 - 3) meet with research staff at each of the Regional Centers (David, Santiago, Chepo) to seek their input into the final document.
 4. At the end of this quarter the Committee was close to finish but still working on the preparation of the first draft report.
 5. The chief objectives of IDIAP's strategy to promote national development and sustainable agricultural sector growth are: a) Improvement of employment; b) Increased income and, c) Improvement of the efficiency and productivity of the agricultural sector.
 6. The overall strategy proposes to act on the following areas:
 - a) Consolidation of the Institutional Organization of IDIAP;
 - b) Strengthening of research programs and,
 - c) Strengthening of Coordination and Consultation mechanisms.
- B. Goal: "To assist IDIAP in the preparation of Training Plans for staff development".

A C T I V I T I E S

1. The Ag. Research Adm. Spec. became acquainted with current training activities for IDIAP staff, progress and problems

of trainees as well as on the administration and management of the Training Program. The specialist worked closely with Ing. Gemino Kleber Vargas, oficina de capacitacion de post-grado and Ing. Bernardo Ocaña, Asesor de Cooperación Técnica del IDIAP.

2. The Ag. Research Adm. Spec. was available for consultations as requested and was called on various occasions for this matter.
 3. The need for development of Training Plans for staff development has already been discussed with IDIAP counterparts but still waiting for action to be taken. In the meantime the Ag. Research Adm. Spec. will prepare a "Working Document" intended to spearhead IDIAP on the preparation of a well thought and detailed Training Plan for staff development.
- C. Goal: "To assist IDIAP in the identification of research opportunities and development of effective methodologies likely to cause a significant impact on the agricultural sector".

A C T I V I T I E S

The Ag. Research Adm. Spec. considered as a first order of bussiness to become acquainted with past and present research planning and implementation at IDIAP.

This study revealed the following:

1. The quantity of resources allocated to any given activity has been rather small and many times are not provided on a timely basis.

2. Research at IDIAP is conducted on both Agronomic Crops (and soils) and livestock production. According to the POA (Plan Operativo Anual) 1984, the livestock component alone used 45 percent of the research budget at IDIAP with 90 percent of that amount being allocated to bovine research with emphasis in forage and animal nutrition activities (55 percent).
3. Within the agronomical research there is a large concentration of activities in basic grains (142 out 259 or 55 percent) commodities. Within the basic grains, Research in rice and corn make 70 percent alone and the remainder 30 percent is made of sorghum, drybeans, cowpea and soybeans.
4. Among the horticultural crops, significant research in terms of impact, has been conducted on Industrial tomatoes, onions and highland tropical potatoes. Significant research is also being conducted on plantains and to a lesser extent Cocoa.
5. Basic grains research and production is particularly aimed at domestic consumption. However, two of the most important grain crops i.e. corn and drybeans are insufficient to meet internal market demands and the deficit is made up from by imports. On the other hand, Panama produces a variety of tropical fruits and vegetables and a good possibility exists for development of exporting markets for them. At this juncture, however, only bananas are exported on significant quantities to be considered of importance as a factor affecting the trade balance of agronomical goods. A new action plan and strategies to improve the outlook of vegetables and tropical fruits as export commodities will be needed and adequate economic support should be found to allow a better balance of activities between domestic consumption and

exporting market activities.

6. A great deal of attention has been given to on-farm research and validation trials by either working directly on farmer fields or in Experiment Stations. Very little has been done in terms of more basic oriented research and this is reflected by the deficiency of well equipped laboratories. More specialized, practically oriented basic research is needed and a great effort will have to be put into building and equipment of laboratories for the support of field oriented activities and the generation of more innovative research aimed at development of comparative advantages.

- D. Goal: "To act as in-country Coordinator of the Technical Assistance provided by Rutgers University to the ATD project in Panama".

A C T I V I T I E S

1. The Ag. Research Adm. Spec. did spend about 40 percent of its effective time devoted to Coordinating activities.
2. All the coordinating activities can be grouped as follows:
 - a) Keeping records of activities and reports from each member of the technical Assistance Team provided by Rutgers.
 - b) Participate and assist in the coordination of visits by faculty from Rutgers University as part of back stopping efforts to the Technical Assistance to the ATD project.
 - c) Revision and editing, both in Spanish and English, of quarterly reports and work plans prepared by TA team members.

d) To act as a liasson person between Rutgers, IDIAP and USAID/Panama.

- Arrangements were made for the visit of Dr. Alvaro Cordero to be interviewed for the Soils Especialist position in the ATD/Panama project. Activites included visits with: 1) IDIAP officials at the headquarters and the Regional office at Santiago; 2) Soils labora-tory at Divisa and 3) AID-Agricultural sector office. At the end of Dr. Cordero's tour to Panama, the project coordinator informed back to Rutgers on the sucess of the interview process and that contract negotiations should follow.
- Invited to participate of the AID-Ag. sector meetings, on several occasions.

e) To continuously explore new lines of interinstiutional cooperation between IDIAP and Rutgers as well as making recomendations for future proyjections of the Technical Assistance in Panama.

- The Ag. Adm. Research Spec. went back to Rutgers Uni-versity for 2 weeks during the month of June for on campus consultations related to progress and directions of the ATD project.