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CONSULTANCY REPORT ON TECHNICAL ASSISTANCE TO FEPROEXAAH FOR DEVELOPMENT OF PINEAPPLE AND MANGO EXPORTS FROM HONDURAS.

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PROYECTO DE APOYO A LA EXPORTACION DE PRODUCTOS AGRICOLAS NO-TRADICIONALES DE CENTRO AMERICA Y PANAMA

CONSULTANCY REPORT ON
TECHNICAL ASSISTANCE TO FEPROEXAAH FOR DEVELOPMENT OF
PINEAPPLE AND MANGO EXPORTS FROM HONDURAS

PROEXAG
Non-Traditional Agricultural Export Support Project

Presented by:

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February, 1990

PREFACE

The purpose of this consulting mission was to provide follow-up technical assistance to the FEPROEXAAN (FPX) institution in San Pedro Sula, Honduras in the implementation of earlier recommendations for the development of fresh pineapple and mango export projects in Honduras.

The terms of reference of the assignment called for further discussions and decisions with the Manager of Product Development to implement recommendations made on an earlier visit, to reconcile these with the FPX operation plan, and to agree on the division of responsibilities for implementation. The scope of work also called for additional and repeat visits to selected farms and farmers involved with or having interest in the production and/or sourcing of the identified export products; to assist the FPX staff to explore the technical and business feasibility of production and marketing arrangements previously recommended; to provide technical and business advice to the same staff on the further development of pineapples and mangoes as significant export crops for small and medium sized farmers in association with multinational marketing companies; and to inform PROEXAG on whether and how to further assist FPX and targeted growers of these crops in Honduras.

The methodology used to complete this assignment consisted mainly of further personal contact with farmers and companies identified in an earlier visit to Honduras; frequent field trips to known production sites and follow-up on new leads provided during conversations with farmers; and meetings or discussions with representatives of the targeted marketing companies. Visits were also held with technical services companies or institutions to source a wider base of technical information or assistance needed by the producing companies or farmers. Extensive discussions and work meetings were held with the FPX staff to produce preliminary business plans for the development of the targeted crops, using data and information gained in similar consulting and/or work experience in Latin America.

The consultant wishes to acknowledge the support and assistance provided by the staff of FPX and particularly the attention given by Mr. Medardo Galindo, Division Manager of Product Development, Mr. Nelson Ortiz - Pineapple Product Manager, and Mr. John Gaffney - Mango Product Manager in arranging field visits and meetings with Honduran agribusinessmen. Their help greatly contributed to the accomplishment of the mission objectives.

EXECUTIVE SUMMARY

Additional progress was made in further identifying and assisting the farmers and companies visited during the first trip in November, 1989 which are involved with or interested in the production and marketing of pineapples and mangos. Where appropriate and necessary, technical advice and information was provided to them in the form of recommended cultural practices and post harvest handling systems.

A meeting was held with Mr. Eric Mattson of the Viking Fruit Company, a consortium of Scandinavian fruit companies who have a weekly refrigerated vessel loading bananas in Honduras. Because of a previous business relationship by the consultant with these companies, Viking Fruit Company asked to have priority consideration in the marketing of Honduran fresh pineapple and mangos produced under the auspices of the FPX non-traditional agricultural export program. This would solve a serious existing problem of availability and regularity of transportation of these products to the North European market. Details on preliminary sample shipments to the Viking Fruit Company were discussed and agreed upon.

Specific recommendations were given to the FPX management for the development of a regular smooth cayenne pineapple nursery in the Lake Yojoa area; to conduct a research program for post harvest handling procedures for the Sugar Loaf variety pineapple for a specialized market in Great Britain; to pursue the possible development of a joint venture pineapple production and marketing cooperative in Pajuiles involving small growers and the General Products Trading Company; to increase the promotion of the technical assistance expertise which can be provided by FPX to export oriented farmers; to study the possible equity interest in a joint venture with a Comayagua mango farm; and to define and foster a closer relationship with other institutions or organizations promoting or assisting in the development of non-traditional export development programs in Honduras and Central America such as PROEXAG and particularly the Honduran Federation of Agricultural Research (FHIA).

In conjunction with field visits to farmers, transfer of technology regarding pineapple production and packing and mango post harvest handling practices were conveyed to the respective product managers. The format for preparation of a model fresh pineapple project of 100 hectares with production, capital investment, and financial projections data was provided to the Pineapple Product Manager. Business analysis, cost per box projections and other financial information were provided for the establishment of a mango export project. Packaging technical advice was provided and plans made to obtain improved corrugated cartons for exporting the target crops.

During the course of the visit, discussions were held with the Manager of Product Development and the Product Managers on the actions needed to implement the recommendations from my earlier visit and their application to the operating plan of FPX.

Informal discussions were held regarding the roles of FPX and FHIA in assisting farmers to produce and export non-traditional crops. A professional rivalry exists between these two institutions and clarity of their functions had not been agreed upon at the time of departure from the country.

It is felt that considerable progress was made in achieving the goals of the mission and it is hoped that the recommended appropriate follow-up action will be taken by PROEXAG.

INTRODUCTION AND BACKGROUND

FEPROEXAAM (FPX) is a Honduran institution receiving financial and technical assistance from the United States Agency for International Development to promote and assist in the development of non-traditional agricultural exports. It consists of a federation of agricultural companies interested in or actually exporting tropical products. The mission of FPX is to provide technical assistance in post-harvest technology and marketing development. It is also involved to a certain degree in providing technical expertise in selected crops for solving production problems when no in-country expertise exists or is lacking.

Both mangoes and pineapples are a major priority for FPX in Honduras and have been subjected to a formal Project Development Plan calling for technical assistance to identify and evaluate possible or existing projects and then provide ongoing assistance to achieve targeted export quantities during the 1989-1990 fiscal year.

In accordance with its Operating Plan for this season, FPX requested assistance from PROEXAG to assess the development of each of these crops in Honduras while providing on-the-spot technical assistance to individual growers during the actual season. PROEXAG provided to FPX in October, 1989 the resume of a person (this consultant) competent in both crops and knowledgeable about Central America as a possible candidate to perform technical assistance consulting.

FPX hired David J. Anderson directly for an initial reconnaissance visit in November, 1989 (first visit) which resulted in several recommendations for development of an export program involving fresh pineapples and mangoes.

As a result of that visit and acceptance of the recommendations by FPX, PROEXAG offered to provide further technical assistance for the project, hence the consulting assignment to Honduras (second visit) during January 17-31, 1990 of this consultant.

The scope of work assigned for the second visit was as follows:

1. Work with FPX's Division Manager for Product Development and the Product Managers for pineapples and mangoes to determine the actions needed to implement the recommendations made during an earlier reconnaissance trip, reconciling them with FPX's operating plan where possible, and agreeing on division of responsibilities for implementation.

2. As directed by FPX management, visit selected farms and farmers as described in the November trip report, to help FPX staff explore the technical and business feasibility of production and marketing arrangements suggested in the earlier report
3. Provide technical and business advice to FPX staff on how to further development of mangoes and pineapples as significant export crops for local small or medium sized farmers, almost certainly in association with multinational companies.
4. Provide advice to PROEXAG on whether and how to further assist FPX and target growers of these crops in Honduras.

All aspects of the above scope of work were accomplished and will be pointed out in the text of the findings and conclusions of this report.

FINDINGS

A. Pajuiles Pineapple Area

A visit was made on Saturday, January 20, 1990 to the area known as Pajuiles which is located northeast of San Pedro Sula on the highway to Tela and La Ceiba in the northern part of Honduras. Accompanying me on this trip was Sr. Nelson Ortiz, Pineapple Product Manager for FPX and Sr. Roberto Rivera, pineapple grower.

Purpose of the trip was to visit the pineapple farm of Sr. Rivera located in Planes Arena Blanca. Two varieties of pineapple are produced on the farm - Regular Smooth Cayenne and Montufar (Sugar Loaf). Sr. Rivera is interested in establishing a smooth cayenne variety nursery to expand his farm. My objective was to assess the commercial agricultural practices of the farm and to discuss nursery establishment methods.

The farm currently has 14 manzanas (24.2 acres) which is planted to 5.2 acres of Smooth Cayenne and 19 acres of Sugar Loaf pineapple. The plan of the farm is to add 17.3 acres (10 manzanas) more in 1990. Supervisor of the farm is Sr. Marco Antonio Santos. The farm is planted on steep slopes using the contour method of planting. Mechanization of the farm is very difficult without special, expensive machinery.

The Smooth Cayenne pineapple is planted in double rows which are 60 centimeters apart. The plant distance in-line is 30 centimeters. The distance between each double row (interspace) is 1.20 meters. The reported density is 36,000 per manzana (20,810/acre). The pineapple is not planted on raised beds. Thecla insect damage was noticed in the fruit. The current control program for Thecla is 3 applications of Decis or Malathion insecticide every 10 days beginning at flowering time of the plant. Perfekthion (Dimethoate) insecticide is used for mealybug control at the rate of 50 cc product in 17 liters of water applied foliar at 136 liters per manzana. Not many mealybugs were seen in the plantings and mealybug wilt is not a serious problem on this farm.

The pineapple was planted in August, 1988 and forced in August, 1989. Harvest is estimated to begin in mid-February of this year and finish in March. It appeared that the planting was not uniform and many plants were not forced. Fruit shape is good, and the crown size to fruit size ratio is very close to the preferred ratio of 1:1. Pieces of white plastic fertilizer bag material is being placed on the pineapple somewhat like sombreros to shade the fruit for sun burn control.

The fertilizer program is to apply 600 Lbs. of 18-46-0 fertilizer incorporated into the soil before planting. Foliar applications of fertilizer begin 2 months after planting using 55 Lbs. of Urea Nitrogen plus 30 Lbs. Potassium Chloride in 55 gallons of water per manzana. This is done monthly for a total of 10 applications.

Forcing for fruit is done with Ethrel hormone plus Urea Nitrogen. The solution used is 11 cc Ethrel plus 0.5 Lbs. Urea in 17 liters of water. The 17 liters of mixed product is applied to 700 plants. Forcing is done when the plants weigh 5 Lbs. each or more, usually at 10 months of age. Forcing applications are made in the evening from 5 P.M. on. The forcing method used is equal to 980 cc of Ethrel plus 44.5 Lbs. of Urea per 400 gallons of water. The application rate is equivalent to 24.3 cc per plant or 133 gallons per acre based on 36,000 plants per manzana. This application rate is about 50 percent of the recommended rate and accounts for the low forcing take.

An area with dead/dying plants was found and an inspection made. Preliminary determination of the problem is Phytophthora rot, commonly called Heart Rot because the disease infects the leaves in the heart of the plant, eventually killing the plant and spreading to nearby plants. It is easily identified in the early stages by removing the affected leaves and smelling a very strong rotten odor. This pineapple disease occurs mainly in high pH soils (above 6.5) during hot, rainy weather at any stage of growth, but usually during the first four months after planting. It has been known to occur also just prior to forcing at 8 - 10 months age. The disease can be controlled by good selection of soil Ph and drainage, careful seed handling, and fungicide treatments of the planting material before and after planting.

Attention was focused on seed production from the existing planting of Smooth Cayenne pineapple. Several methods of producing seed were presented and discussed with the farm owner and supervisor. Two methods - gouging and chopping, were demonstrated on the farm. A prototype gouging tool was prepared from a tree branch and a plant was gouged with an explanation of the purpose and method of seed production. The plant which was gouged was then dissected showing a heart cut of the method, which damages the apical meristem of the plant and causes it to produce shoots from buds on the stem of the plant.

An area of about 2 manzanas of 3rd ratoon crop was recommended to be converted into seed production by chopping the plants back or by gouging the apical meristem, depending on the condition of the plant. Gouged plants should begin producing seed about 2-3 months after gouging and produce 0.5 seeds per mother plant per month average for about 6-12 months.

Recommendations for this farm for the smooth cayenne pineapple operation are as follows:

1. Perform soil testing prior to planting and leaf analysis during the first 10 months of growth on 2-3 month intervals. Attention must be given to soil pH and soil fertility status. A pH of 4.0 to 6.0 is recommended for pineapple.
2. Pre-plant Fertilizing: Depending on the soil test results, apply 75 Lbs. of actual nitrogen, 150 Lbs. Phosphorous, and 400 Lbs. Potassium per acre before planting, broadcast into the planting rows. If soil is low in magnesium, add 140 Lbs. of Magnesium Sulfate per acre. (One acre equals 4047 sq. meters or 0.578 Mzs.).
3. Post-plant Fertilizing: One month to 45 days after planting apply 8 grams per plant of Ammonium Sulphate to the base of each plant. Do not place fertilizer in the leaf axil or heart of the plant.
4. Foliar Fertilizing: Apply 55 Lbs. of Urea Nitrogen or 63 Lbs. of Ammonium Nitrate plus 20 Lbs. KCL plus 8 Lbs. Iron Sulfate plus 1.0 Lbs. Zinc Sulfate in 50 gallons of water per acre (327 liters per manzana). Repeat this application monthly beginning the 2nd month after planting, and continue until the plants are forced.
5. Mealybug/Ant Control: Apply 715 - 1500 cc of Diazinon 60 E.C. in 300 - 500 gallons of water per acre, applied foliar. For ant control in the field, apply 1500 cc of Diazinon 60 E.C. in 400 gallons of water per acre. For field borders or in ant mounds, apply 2.5 Lbs. Mirex per acre or 1.5 Lbs. per acre of Amdro (Combat, Maxforce). These products are not approved for use within the pineapple growing field, only on field borders or in ant mounds.
6. Thecla Control: Applications of insecticides usually start at the early fruit cone stage of fruit development which is 70 - 80 days after forcing. Apply one of the following products:
 - a. Diazinon (Basudin): Maximum of 14 cycles, every 7 days. Apply 1000 cc of 60 E.C. commercial product in 400 gallons of water per acre. Number of cycles varies from 3-14.
 - b. Sevin (Carbar 1): Maximum of 7 cycles, every 10 days. Apply 0.375 gallons of Sevin XLR commercial product in 400 GPA of water. Number of cycles varies from 4-7.

7. Phytophthora Control: 1) Pre-plant dip of seed pieces in Aliette 80% wettable powder using 1.25 - 2.50 Lbs. per acre of commercial product in 100 gallons of water. Dip the seed pieces long enough to wet the material.
2) Post-plant spray of 1.25 - 3.75 Lbs. of Aliette 80% commercial product in 400 gallons of water per acre. Maximum of 4 sprays per year at 3 month intervals. Last spray must be 3 months prior to harvest.
8. Floral Induction: When the average plant weight of the population is 4.5 - 5.0 Lbs. and/or 60% of the plants weigh more than 4.5 Lbs., flower induction should be done. Apply 1183-1893 cc of 4.0 Lbs. commercial product Ethrel in 400 gallons of water per acre (73 cc solution per plant in Planes Arena Blanca) plus 87.0 Lbs. Urea and 2.2 Lbs. Calcium Carbonate. The spray solution must be applied within 2 hours of mixing. Do not mix or apply if rainfall is expected. Apply only in the early morning or late afternoon when air temperature is less than 80 degrees Fahrenheit. Apply foliar, directed towards the heart of the plant. Repeat this application using the lower rate of Ethrel within 5 days of the first application.

This farm can serve as an excellent source of Smooth Cayenne seed due to the size of the existing plantings. A program of improved agricultural practices should be implemented, especially a seed purification system to eliminate any spiny plants and plants with fruit exhibiting genetic defects such as fasciation, collar-of-slips, multiple crowns, or deformed crowns or fruit.

The road into this farm should be improved to allow year round access and to haul fruit out even during the rainy season. Eventually the owner will want to recycle the planting of pineapple on the same land, and land preparation methods will be important. A small Caterpillar type tractor with sub-soiler, harrow, and front blade would be very helpful in working the steep slopes and preparing the soil for replanting, as well as clearing land and repairing roads.

It is recommended that land of more favorable topography (less than 15 percent slope) be sought in this area to establish the commercial nursery, so that some semi-mechanized field maintenance practices can be conducted. This farm could serve as the source of Smooth Cayenne seed for expansion of the small grower pineapple project in this area of Honduras. This would be an excellent type of joint venture for FPX to consider.

B. Quimistan Valley

On January 22 a field trip was made to the Quimistan Valley with Sr. Nelson Ortiz, Pineapple Product Manager for FPX. Purpose of the visit was to survey the area once more for possible pineapple production sites and to assess the Smooth Cayenne pineapple operation of Lic. Edwin Rosenthal in Chumbagua which was visited during my trip in November, 1989.

Enroute to Chumbagua, we measured the elevations above sea level and noted the land topography, soil type, cropping patterns, and other aspects important to possible pineapple cultivation. In Cofradia (154 meters ASL), we noted an area of rolling hills and pastures. Major crops planted were sugar cane and corn. Soils on the hills were red and presumably acidic (less than pH 7.0). Travelling on, we came to Camalote, elevation 220 meters ASL. The topography was rolling and the soil appeared to be much redder in color. There seemed to be a larger area of suitable land here for pineapple cultivation. For these reasons (soil, elevation, land area, topography), this area should be investigated further for a possible pineapple production site by medium size growers. More information is needed on rainfall, temperatures, soil type and pH, and irrigation possibilities.

In Quimistan (elevation 175 meters ASL), we visited the local office of the Ministry of Natural Resources hoping to obtain some of the above mentioned information. A weather station is located there but no data was available in the office. A return visit by Nelson Ortiz is necessary.

At the entrance to San Marcos, the elevation was 220 meters ASL and the topography was better for mechanized agriculture (flat to rolling). The Chamelecon River is nearby which is an excellent source of irrigation water. This general area is probably suitable for pineapple cultivation, depending on soil conditions (pH, drainage, texture, etc.). The pineapple operation of Lic. Rosenthal is nearby.

We visited the pineapple farm of Lic. Edwin Rosenthal located in Chumbagua. As reported previously, this is a very large sugar cane farm of 6,000 manzanas (10,380 acres), which is being diversified by the owners. A large planting of grapefruit and other citrus, rice, and pineapples are among the diversified crops. The farm has a sugar mill and very good infrastructure along with vehicles, farm machinery, and other equipment needed for pineapple cultivation. Elevation of the pineapple planting is 224 meters ASL.

This farm has 35 acres of Smooth Cayenne pineapple planted using seed from Guatemala. Information regarding the status of the project and agricultural practices were noted in my report of November, 1989.

According to my memory of the pineapple farm condition last November, I was surprised to see it with several problems this time. Weed control was lacking, especially in the lower area of the planting. The plants were exhibiting symptoms of nutritional deficiency, perhaps intensified by the dry weather. Leaf samples were taken and delivered to FHIA for analysis of nitrogen, phosphorous, potassium, calcium, magnesium, and iron.

Plant growth also appeared to be retarded, again probably due to the dry weather in the farm during the last two months and also to low fertility status of the plants. Bottom leaves of the plants were dry and yellow, possible symptoms of magnesium deficiency. Some plants were affected by Mealybug Wilt and a recommendation was made to remove and destroy these plants, followed by an insecticide application of Diazinon to the affected area. Some weed control was being practiced, but was behind schedule.

Forcing of the plants with Ethrel to produce fruit had not yet been conducted. This was discussed during my visit in November and had been planned for December as the plants were approaching the correct average plant weight and age. The late forcing will result in bigger, perhaps oversize fruit. This type of fruit is more prone to fruit disease and disorders. Also, more naturally differentiated fruit will occur. Harvest time now has been delayed to late July - August, a period of historically low demand and prices for pineapple in the marketplace due to the abundance of other competing fresh fruit.

Forcing instructions were given to Sr. Mauricio Ramos, Supervisor of the pineapple farm. Other recommendations given were: 1) to irrigate as soon as possible; 2) apply foliar applications of nitrogen, potassium, and magnesium before forcing and up to 30 days post-forcing; 3) prepare for Thecla insect control; and 4) improve control of Mealybug Wilt.

Below are some technical recommendations to be implemented on the farm:

1. **Weed Control:** Remove all existing broadleaf and grassy weeds by hand, shake loose the soil, and put into the interspace or carry outside the pineapple. Do not put weeds on top of the pineapple plants. After hand weeding, apply two (2) Lbs. per acre of Karmex (Diuron) 80% wettable powder (1.6 Lbs. active ingredient) per acre in 400 gallons of water. Apply this to the interspace. Less water can be used, but do not use less than 250 GPA.

2. **Irrigation:** Immediately following weed control, apply the equivalent of 1.5 acre inches of water every month until pineapple flowering or rainfall occurs. Irrigation may be by gravity or sprinkler. In the case of sprinkler irrigation, do not irrigate during flowering and up to the dry petal stage to prevent any possible chance of Erwinia infection.
3. **Foliar Fertilization:** Apply three applications of 63 Lbs. of ammonium nitrate plus 1.3 Lbs. zinc sulphate in 50 gallons of water per acre. Observe for leaf burn. If present, apply at 100 gallons per acre. One of these applications may be made up to 30 days after forcing. Immediately prior to forcing apply 160 Lbs. of potassium chloride in 400 gallons of water per acre.
4. **Flower Induction:** When the average plant weight of the population is 4.5 - 5.0 Lbs. and/or 60% of the plants weigh more than 4.5 Lbs., flower induction should be done. Apply 1183-1893 cc of 4.0 Lbs. commercial product Ethrel in 400 gallons of water per acre (120 ml solution per plant in Chumbagua), plus 87.0 Lbs. Urea and 2.2 Lbs. calcium carbonate. Spray solution must be applied within 2 hours of mixing. Do not mix nor apply if rainfall expected. Apply only in the early morning or late afternoon when air temperature is less than 80 degrees Fahrenheit. Apply foliar, directed to the heart of the plant. Repeat the above application using the lower rate of Ethrel mix within 5 days of the first application.
5. **Mealybug/Ant Control:** Mealybugs (Cochinilla) are small sucking insects of pink or grey color that feed on the leaves and roots of pineapple plants. They are capable of transmitting a virus known as Mealybug Wilt (MBW) which has no known control. This virus can be of epidemic nature and has ruined many pineapple operations throughout the world when not controlled. Mealybugs are carried about by ants which feed on the sticky secretion of the Mealybug. To control Mealybugs and MBW, one must also control the ant population as well. Below are recommended insecticides to be used to control these insects. In addition, plants affected with the wilt must be removed and destroyed, preferably by burning. MBW symptoms are reddish discoloration of the leaves which later turn to pink; curling and drying of the leaves; leaf tip dying; loss of turgidity in the leaves; and dying and dropping of the leaves. After removal of the infected plants, the surrounding area should be sprayed with Diazinon and the same dosage used for general mealybug control: 715-1500 cc of Diazinon 60 E.C. in 200 - 500 gallons of water per acre, applied foliar. For ant control in the field, apply 1500 cc Diazinon 60 E.C. in 400 GPA of water. For field borders or ant mounds, apply 2.5 Lbs. per acre of Mirex or 1.5 Lbs. per acre of Amdro (Combat, Maxforce). These products (Mirex & Amdro), are not approved for use in growing pineapple fields.

6. **Thecla Control:** This butterfly like insect deposits eggs on pineapple plants during fruit development and the emerging larvae eat the pineapple flower parts. This causes a damage to the fruit in the form of an indented scar, resulting in reject of the fruit for export. Control starts at the fruit cone stage of development which is normally 70-80 days post force, and continues depending on the presence of the insect, eggs, and larvae. Control methods are:
- a. **Diazinon (Basudin):** 1000 cc of 60 E.C. commercial product in 400 gallons of water per acre. Maximum of 14 cycles, every 7 days. Number of cycles varies from 3-14.
 - b. **Thiodan (Endosulfan):** 0.35 gallons of Thiodan 35 E.C. commercial product in 400 GPA of water. Maximum of 7 cycles, every 10 days. Number of cycles varies from 4-7.
 - c. **Sevin (Carbaryl):** 0.375 gallons of Sevin XLR commercial product (4.0 Lbs. active ingredient per gallon) in 400 GPA of water. Maximum of 7 cycles, every 10 days. Number of cycles varies from 4-7.
 - d. **Sevin (Carbaryl):** Only one application at the early fruit cone stage of Sevin 5 G or Carbaryl 5 Granular commercial product at 0.5-0.75 grams per plant applied by hand directly to the fruit cone of the each plant. Make a small trial application before beginning commercial application to observe for chemical burn to the plant. Some formulations of Sevin 5 Granular can be toxic to the plant.

Pineapple Leaf Results and Interpretations
(Fresh Weight Basis)

<u>Nutrient</u>	<u>Analysis</u>	<u>Low</u>	<u>Adequate</u>	<u>High</u>
	%			
N	0.11	0.10	0.25	0.35
P	0.023	0.009	0.015	0.020
K	0.25	0.30	0.45	0.50
Ca	0.026	0.004	0.040	0.050
Mg	0.026	0.009	0.030	0.04
<u>PPM</u>				
Zn (Stem)	3 (Leaf)	4	8	
Cu	1	N/A		
Mn	10	N/A		
Fe	9	3	10	20
B	-	N/A		

Results of the leaf analysis indicate that the pineapple is at a critical level for nitrogen and potassium. These elements must be applied as soon as possible.

A meeting was held on Monday morning, January 29 with Lic. Edwin Rosenthal Jr. to discuss the Chumbagua pineapple project. Also present in the meeting were Sr. Medardo Galindo, Mgr. of Product Development and Sr. Nelson Ortiz, Pineapple Product Manager, both of FPA. We presented the results of our assessment of the pineapple project and listened to the comments of Lic. Rosenthal. The pineapple project is not regarded highly within the Rosenthal group due to losses from previous production and a lack of understanding of correct agricultural practices.

We explained the technical assistance program now available through FPX and the possibilities the Chumbagua project had for export. We also discussed the potential for expanding in the same area and the financial benefits from properly produced pineapple for export. Finally we talked about the interest of FPX to purchase the 30,000 Smooth Cayenne seeds that Chumbagua has for sell, with the idea of using this for a base of seed production for a Smooth Cayenne nursery to be operated in a joint venture by FPX.

It appeared that Lic. Rosenthal was interested in obtaining a copy of the consultant's trip report from FPX and trying to implement the technical recommendations so that production from the current plantings could be aimed at the export market.

Close contact will be kept with this producer of pineapple to provide assistance in developing a medium size pineapple export project.

C. General Products Trading Company

A meeting was held on January 23 with Mr. Ali Wahidi, Director of International Marketing for the General Products Trading Company, an exporter of Honduran fresh fruit.

This company would like to export Smooth Cayenne pineapple but due to its unavailability they are shipping the Sugar Loaf variety.

Shipments of Sugar Loaf pineapple to a client in England (SHL UK Limited) were made in October and November of 1989. Temperature of the shipments were set at 47-50 degrees Fahrenheit, although no recorders were sent with the shipment to check the actual temperatures during the voyage. The pineapple reportedly arrived in good condition but soon developed "black spot" in the fruit.

The fruit was cooled from 85 degrees to 65 degrees F. using ice water, packed, and then loaded into a refrigerated container set at 46 degrees. It took two days to load the container, which was opened and closed frequently to load the boxed fruit. The fruit was shipped on the Hapag Lloyd lines and the container was changed at the port. Length of the voyage was 17 days. Upon arrival, the fruit was placed into cold storage. Fruit quality problems were reported 6-7 days later.

Photos were available of the fruit. The pineapple at 6-7 days after arrival had the definite appearance of Internal Browning disorder. Close inspection of the photos of fruit inspected upon arrival showed Internal Browning beginning to appear around the fruit core. There is no doubt in my mind that the fruit was affected by Internal Browning because of the type of pineapple and the post harvest handling methods. Sugar Loaf pineapple is low in acid (0.3-0.5) according to measurements conducted by the FHIA research department. Sugar levels are between 12 and 14, resulting in a very high Brix/Acid ratio. This natural fruit condition predisposes the Sugar Loaf pineapple to Internal Browning when shipped long distances. The fluctuating temperatures during packing and shipping also contributed to provoking the disorder to occur.

Some mention was made of a shipping temperature as low as 37 degrees F. during the voyage. In my opinion, the fruit would have arrived in poor quality with chilling injury apparent at the moment of discharge.

Although it is unfortunate that this problem happened, the information gained will contribute to improving future shipments. According to Mr. Wahidi, his client would like to receive 4 containers of pineapple on each voyage of Hapag Lloyd to England from Honduras. The shipping schedule is two vessels per month, one every two weeks.

The possibility of exporting 8 containers per month of pineapple is interesting to the General Products Trading Company. They would like the involvement of FPX in providing technical expertise in solving the Internal Browning problem. Furthermore, they are also interested in growing pineapple and have limited capital available for this purpose. Apparently a cooperative in the Pajuiles area approached Mr. Wahidi to market fruit from a proposed 150-300 hectare project. These growers have a feasibility study prepared to obtain financing. Mr. Nelson Ortiz of FPX has been instructed to obtain more information on this cooperative and determine if FPX can be of any assistance.

In addition to pineapples, the General Products Trading Company has clients willing to purchase 1000 ten pound boxes weekly of mangoes.

FEPROEXAAH should work closely with Mr. Wahidi in the development of the pineapple export industry in Honduras. More information should be obtained regarding the interest of this company in forming a pineapple growing company and a possible role in the new Pajuiles pineapple growers cooperative. Assistance in preparation of a feasibility study with production, financial, and marketing details can be prepared when the project size and capital available are known.

Of greater importance, however, is the immediate opportunity for providing technical assistance to current producers of pineapple and to the GP Trading Co. in solving export problems. Discussions were held with Mr. Jack Case, International Marketing Director of the Brogdex Company who is willing to supply experimental samples of pineapple fruit and crown waxes. Trials should be conducted regarding post harvest practices on the Sugar Loaf pineapple in order to begin an ongoing export program. Due to my extensive knowledge and experience in pineapple post-harvest management, I can provide a research proposal and leadership on a series of trials using various degrees of fruit ripeness and post harvest treatments and temperature regimens.

Trials conducted in the pineapple fields with Sugar Loaf growers should also be started to manipulate the Brix/Acid ratio of the fruit through cultural practices. This work should begin as soon as possible as there is an abundance of fruit available now for research. Fruit of the Smooth Cayenne variety will be available in Mid-February to March for similar trials.

To my knowledge, hydro-cooling of pineapple prior to packing is not practiced commercially by the major growers/packers of pineapple. The current general practices are: 1) harvest at the proper stage of ripeness for the length of voyage, 2) place in a water tank for washing and supplying the packing plant, 3) sorting by size and defects of fruit and crown, 4) spray or dip in fungicide/wax mixture, 5) packing in corrugated carton, 6) palletizing, 7) forced air cooling to lower temperature from average of 85 degrees to about 65 degrees F. in 3-6 hours, 8) cold room storage or refrigerated container shipment to the Port at 45 degrees F, and 9) refrigerated shipment to market at 45-50 degrees F. Major time breaks in this process where fluctuations of fruit temperature from cold to warm to cold or warm to cold to warm occur will contribute to Internal Browning. Any physiological stress or fruit with an imbalanced brix/acid ratio i.e. high sugar-low acid will also affect the incidence and severity of Internal Browning.

Considerable effort should be devoted to addressing proper fruit harvesting, packing, and shipping methods before attempting large scale commercial shipments. If technical problems can be solved in exporting Sugar Loaf pineapples from Honduras, a small export business can be established while the long term conversion of this pineapple to the more desirable Smooth Cayenne variety is accomplished.

We visited the packing plant of the General Products Trading Company in Las Flores on January 23. The packing plant is about 50 feet long by 30 feet wide. It has a cement floor and galvanized tin roof. The equipment includes the following:

- 2 - Washing/cooling tanks of 3'x 15'
- 1 - Fiberglass dip tank of approx. 100 gallons
- 5 - Wooden tables of 4'x 16' covered with chicken wire for drip drying fruit
- 1 - Steel frame table with 4'x 4' plywood top for weighing and packing fruit

The packing plant has running water, a new water well, a house and office, chemical storage area, garage, and new ice plant under construction. Beneath the office a new cold storage room of 6x12x2 meters is under construction. There is ample room for refrigerated containers to enter and turn around. I was impressed by these simple facilities and the potential they have for a good packing station for pineapple. The packing plant is located adjacent to the road junction leading to Santa Cruz de Yojoa and to Lake Yojoa, in an area of considerable pineapple cultivation.

The current pineapple packing process in use is:

1. Receive fruit from field and sort out rejects.
2. Wash fruit with Xedex detergent and water.
3. Brush fruit to remove dirt, foreign matter, and insects.
4. Pass fruit to ice water tank for cooling to 65 degrees Fahrenheit (approximately).
5. Pass fruit to wax and Benlate fungicide dip.
6. Put fruit on wire mesh tables to drip dry.
7. Weigh fruit by sizes 6-8-10. Minimum weights are:
6's- 6.75 Lbs., 8's- 5.0 Lbs., and 10's- 4.0 Lbs.
8. Pack fruit by sizes in 40 Lb. size waxed box.

Some changes can be made to the above packing station with little cost to improve the fruit packing process and fruit quality. A shaded area extending off the Southeast side of the building should be added to keep fruit cooler during the sorting process. This can be done with a tarpaulin and wooden poles or a simple extension of the existing roof line. Three additional small wooden packing tables and 50 Lb. scales are needed, as well as approximately 50 feet of aluminum roller conveyors and two small (10 gallon) stainless steel or fiberglass dip tanks. This will result in higher packing capacity and less fruit and box handling (see diagram for recommended fruit flow). Plastic trays similar to the type used in banana packing stations for moving fruit from the drying table across the packing table and plastic crates with foam padding for hauling fruit should also be used.

D. Lake Yojoa Area

On January 23 we visited the southern province of Cortes from San Pedro Sula to Lake Yojoa. This is an area of extensive pineapple cultivation, especially in the region of the lake.

The town of Oropendolas is located on the main highway to Lake Yojoa and has an elevation of 216 meters ASL. It is in an area of gently rising elevation from the San Pedro Sula valley towards the mountain range near Lake Yojoa. The topography is slightly rolling and soils become redder in color. Land is planted to pasture, corn, and sugar cane. The land area suitable for pineapple farming on a small to medium scale appeared to be fairly extensive. More information on soil characteristics needs to be gathered for this potential pineapple area.

In Las Flores (Santa Cruz de Yojoa) at an elevation of 372 meters, we visited the packing plant for pineapple of the General Products Trading Company which is discussed on pages 14 and 15 of this report.

The field trip then progressed towards the town of Santa Cruz de Yojoa (457 meters elevation). Although soils are known to be very good for pineapple cultivation in this zone, the topography is hilly and many exposed large rocks are present. There appeared to be more cloud cover here as compared to the lower elevation areas of Las Flores and Oropendolas.

Leaving Santa Cruz de Yojoa, we drove up rapidly in elevation to the pineapple farm of Finca Montoya/United Brands (700 meters ASL). A brief stop was made to inspect one of the fields (Lot 3, block 6), as no one from the farm was present. This field was exhibiting yellowing of lower leaves, leaf burning, older leaf dieback, and curling leaves of yellow to red color. Leaf samples (D leaves) were taken and submitted to the FHIA laboratory for foliar analysis.

The next place visited was the area of Lake Yojoa. In this area we visited the "Proyecto Semitecnificación del Cultivo de Pina" conducted by the Corporación Española/Instituto de Cooperación Iberoamericana for Social and Economic Development of Rio Lindo Small Farmers. This is a joint project with the Ministry of Natural Resources. The main emphasis of the project is to improve pineapple production and reduce soil erosion on steep slopes by using the contour method of planting. Improved agricultural practices are also being taught. This project could be an excellent source of Sugar Loaf pineapple for an export development program after preliminary post harvest handling procedures are investigated and determined.

In the same area but close to the Lake Yojoa at 700 meters ASL, we visited the pineapple plantings of Sr. Carlos Fernandez. There are currently an estimated 50,000 plants of Smooth Cayenne pineapple planted between citrus trees.

These pineapple plants are approximately one year old. Some plants had naturally differentiated fruit developing. A few plants with Mealybug Wilt disease and other types of disease were encountered, but the planting was in remarkably good condition for being poorly maintained. Weed control was lacking and no formal program of fertilization and insect control is being practiced. This planting is the remainder of an earlier pineapple project that failed due to lack of marketing planning and preparation. The rich soil in this farm has probably sustained the plants. This pineapple has a good chance for producing export fruit if immediate fertilization, weed control, and insect control is implemented and then the plants are forced within 30-45 days. It has an excellent potential for serving as a base for a pineapple nursery managed by FPX. The seed came from Guatemala and the fruit harvested earlier was reported to be of excellent flavor, size, and shape. Fruit from this farm was green shell ripe, probably due to the cooler, cloudy growing conditions and higher rainfall.

Across the road from the Carlos Fernandez farm is a sugar cane farm owned by Sr. Fuad Hasbun, owner of the Drugeria Nacional in Tegucigalpa. This farm has 230 manzanas of excellent topography and soil. It was identified by me in 1985 as a potential production site for a United Brands fresh pineapple project in Central America. Contact should be made with the farm owner to determine his interest in diversifying into other tropical products. Since the farm is close to the potential pineapple nursery of FPX on the Fernandez farm, it would be a logical location for expansion of the Smooth Cayenne pineapple plantings in Honduras.

Returning towards San Pedro Sula, we stopped to visit the farm of Jose Andino in Los Chirritos (elev. 700 meters ASL). Sr. Andino has 22 manzanas of Sugar Loaf pineapple. He is active in the Pineapple Growers Association in Honduras and participated in a FPX sponsored trip to the United States to acquaint growers with the North American pineapple market. Sr. Andino is interested in planting Smooth Cayenne pineapple and wants help in growing and exporting pineapple. He harvested several Sugar Loaf pineapple which we tested. The fruit was of excellent flavor and had a pH of 3.7 and brix of near 15. Sr. Andino will be a very good farmer to begin the Smooth Cayenne conversion program with when seed is available.

We stopped at the residence of Carlos Fernandez before arriving in San Pedro Sula and visited with his son, Rodolfo. He was very interested to here of our visit to their pineapple farm and presented us a very discouraging story of their past experiences with pineapple and FPX. Apparently the farm in Lake Yojoa produced very well but no market was developed in time to make any shipments. All fruit was sold in the local market but demand was low for the Smooth Cayenne variety. The Fernandez group blames FPX for not being able to assist in marketing the fruit, after advertising to growers that this was part of their export assistance program. It seems that communications were not at their very best and the Fernandez group may have advised FPX of their fruit availability without sufficient time to prepare. Nevertheless, everyone learned from this experience and hopefully it will not be repeated.

Sr. Fernandez indicated an interest in cooperating with FPX in the revitalization of their pineapple in Lake Yojoa and participating in some form to establish a pineapple nursery. Details of several ideas to accomplish this were discussed and Mr. Nelson Ortiz is to follow up within FPX to structure a deal with this grower. This would be a strategic location for the establishment of a Smooth Cayenne nursery as it is in the center of the most extensive pineapple area in Honduras.

On January 25 we passed by the farm of Montoya/United Brands while returning from a visit to Comayagua. We stopped to visit another field where pineapple growing problems had been reported.

In Lot 2, we encountered an extensive plant growth problem, estimated to affect 15-20 percent of the area. We found wilting plants not exhibiting symptoms of typical Mealybug Wilt disease. Older leaves were dying, and the oldest leaves were dead. Younger leaves were showing leaf tip dieback. Upon pulling a plant from the ground, we discovered a very poor root system. No signs of nematode or symphyliid damage were found, nor did we see and soil insects such as white grubs in the root zone. The root system was not healthy, being very restricted and rotting. Many more plants were inspected, and plants with spear like and fan shaped growth were found. Plants were also discovered with no leaves emerging and some had cut, serrated leaves. The disorder called "crooked neck" was present, meaning that newly emerging leaves could not grow upright and therefore doubled back into the center of the plant. Many if not all the plants had chlorotic spots. General nutrient deficiency problems were serious. I am very concerned about the status of this field and the very unusual growth problems which were encountered.

My assessment of the above problems is as follows:

1. It is very probable that excessive or localized lime applications are present, probably due to inadequate spreading and incorporation into the soil. This is causing localized problems of root development and imbalances in the soil chemistry and fertility status.
2. Improper seed selection and/or handling practices were used prior to planting, resulting in old and diseased seed being planted. Some of the seed may have been harvested months ahead of planting and stored in piles where rot began to develop. Plants developed Thielaviopsis rot and the ones that did not die had a sub-lethal infection. This resulted in poor root development and stunted plants. As the plants become older, the root system cannot support the plants nutritional requirements, hence the dying of the leaves.
3. The "crooked neck" disorder is very serious. These plants will probably not produce fruit. The common cause of this problem is zinc deficiency, caused by excessive lime in the soil. The spear like growth of the heart leaves is reported to be another symptom of zinc deficiency.
4. Plants with no heart leaf growth and cut, serrated leaves are typical of Calcium deficiency. This problem could result from insufficient soil calcium levels or imbalances in the soil cation exchange capacity. This problem occurs rarely and needs intensive investigation.
5. Poor general growth is caused by a complex combination of nutrient deficiencies or imbalances. It appears that Iron and Magnesium are lacking, and perhaps phosphorous. A complete review of the fertilizer program amounts and timing is necessary, using pre-plant soil tests and foliar tissue test results to determine the soil and plant fertility status. A micro-nutrient fertilizer program is critical in pineapple for proper growth and fruit quality.

These problems should be addressed immediately by a competent pineapple professional working in conjunction with a soil scientist and laboratory service. Failure to take action soon could result in serious reductions to yield and fruit packout.

E. Comayagua Valley

On January 24 I traveled to the Comayagua Valley between San Pedro Sula and Tegucigalpa with Mr. John Gaffney, Manager of Mango Products. The Comayagua Valley is a broad valley at an elevation of 580 meters and is the traditional production area for tomatoes, cucumbers, onions, watermelons, mangoes, and papaya. There is an extensive irrigation system covering the district.

Purpose of the visit was to meet with Srs. Alvaro Suarez and Enrique Miselem, owners of a 35 acre mango farm. Upon arriving in Comayagua, we first stopped for lunch where we encountered several persons of the FHIA group on a field trip to the area. During lunch we had an opportunity to talk to Mr. Panfilo Taboro, Manager of Diversification for FHIA, regarding the Suarez mango farm and FPX's intention to assist the farm in post-harvest and marketing aspects as requested by the owners. We were surprised to hear from Mr. Taboro that the owners must clear all decisions of this type with him. He explained that FHIA had invested much time and money in flower induction and crop protection and had arranged some marketing possibilities through Dole, Chiquita, and/or General Products Trading Company.

After lunch we met with Sr. Suarez and visited the mango farm. The farm is mainly planted to the Red Haden variety. There are a total of 948 trees, only 7 of which are off-type. In the fall of 1989 about 150 of the trees were pruned and will not produce fruit during the 1990 season. In farm A, all 120 of 161 trees were forced for flower induction in October, 1989 with Potassium Nitrate under supervision of FHIA. It appears that the forcing was done too early, as the take was low. Wind in December blew off many small fruits and flowers. Farm B of 787 trees had 280 forced in October. Fruit harvest is projected for March (15%), April (35%), and May (50%). My estimate is a harvest of about 19,000 ten pound boxes of fruit. The trees and the fruit are clean, i.e. no signs of Anthracnose disease is present. A spray program of Benlate and Dithane very 15 days under the supervision of FHIA is being practiced on the farm. Sr. Suarez is not aware of the cost involved in the work performed to date by FHIA. In my opinion, there may possibly be a small harvest of mangoes beginning the end of February, as some larger mangoes which were cut showed signs of ripening around the seed.

During the visit, we recommended that a windbreak, possibly using Bamboo, be planted and kept irrigated to protect the farm from wind damage to early flowering and fruit formation.

My recommendation is to study the weather pattern of the area and perform flower induction only when the dry season is starting, i.e. a month with no more than 7-10 days rain. In Costa Rica, flower induction has been very successful using this timing. Harvest can be expected to begin 90-120 days following induction. The prime marketing months are January to April, and probably flower induction in Comayagua will be done beginning in November.

In the evening of January 24, we met again with Srs. Suazo and Miselem to discuss their packing and marketing plans. We also prepared a pro forma cost per box estimate and possible sales prices.

On January 25, we inspected the packing plant of Agro International where Sr. Miselem is General Manager. This is a very large and modern cucumber packing plant with palletizing and cold storage facilities available. We determined the best packing location for the mangoes, and designed a fruit flow - packing plant layout.

The same day we visited an Avocado farm in La Paz belonging to Sr. Abram Suazo. This farm has 20 manzanas of 1 year old Avocados which are drip irrigated and extremely well maintained. This is a possible export project in about 3-4 years.

After returning to San Pedro Sula, myself and John Gaffney began working on the mango business plan and asked for quotations for an improved mango box according to my experience of shipping 140,000 boxes of mangoes from Costa Rica in 1988 by sea freight.

On Friday, January 26 a meeting was held between the General Manager of FPX and Mr. Panfilo Taboro and Fernando Fernandez of FHIA to discuss the role of FPX and FHIA in the production and marketing of mangoes in Honduras. It appears that FHIA desires to handle all aspects, including post-harvest and marketing functions.

After returning to my home in Oregon, I was advised by Mr. Medardo Galindo that an agreement was reached whereby Mr. Rene LaFitte, a private agri-businessman with experience in mango packing and marketing will handle the 1990 crop of the Suazo/Miselem farm. LaFitte will send the fruit by air, as he has no experience of shipping mangoes by refrigerated ocean freight.

F. General Meetings

A dinner meeting was held on the evening of Tuesday, January 23 with myself, Mr. Eric Mattsson of Viking Fruit Company, Sr. Medardo Galindo, and Sra. Maria Eugenia de Ruiz (Promotion Investment Director) of FPX.

Mr. Mattsson, whom I knew and worked with while General Manager of Pineapples and Tropicals for Del Monte in Costa Rica, informed us of the details of the new Viking Fruit Company. This company is a consortium of the 4 largest fruit importing companies in Norway, Sweden, Denmark, and Finland. Mr. Mattsson was visiting Honduras with a group of Denmark customers who purchase Chiquita bananas.

The Viking Fruit Company has a chartered vessel calling on the Port of Cortes every week to load 135,000 boxes of Chiquita bananas. According to Mr. Mattsson, Viking Fruit would like to add other tropical products and has confidence in my ability to advise FPX on the standards, quality, and packaging that they desire. Viking Fruit would like to be the first and favored marketing channel for tropical fruits promoted by FPX. Initial shipments would be by air to determine if the product is acceptable, both to Viking Fruit and their customers. Upon approval of the sample shipment, later shipments in volume could be done in containers installed on the deck of the ship. If the program develops into larger volumes, a larger ship with additional below deck refrigerated space could be made available.

The interest shown by Mr. Mattsson and the possibility of marketing to a very large, reliable company with a weekly vessel from Honduras is a major accomplishment achieved by myself and FPX.

On Saturday morning, January 27 we met with Mr. Jim Taylor and Allen Cruz, General Manager and Finance Director respectively of Grupo Alcon, S.A., a division of Cargill Latin America. Purpose of the meeting was to determine the interest of Grupo Alcon to enter into the non-traditional agricultural export business from Honduras.

Mr. Taylor indicated that Cargill was interested in Shrimp, and were beginning a small melon export program from Choluteca. They are also interested in joining FEPROEXAAH. Cargill is not interested in farming per se, and is limited from doing so by the parent company management. The goal is to work with small growers, providing financing through co-signing loan notes or providing capital investment in buildings, machinery, etc.

We discussed several possible projects where they could generate dollar income with low direct risk and they indicated that the company would welcome any such proposals.

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions:

During the visit I added more impetus and focus on the development of export projects for fresh pineapple and mangoes from Honduras. In addition, the beginnings of a transfer of technical assistance technology program was initiated with the Product Managers.

Several extensive and detailed discussions were held with the principals of export oriented projects in the presence of the FPX management. These meetings and field visits with growers are an important part of promoting the credibility of FPX and advertising the availability of professional services which can be provided by FPX.

The real possibility of attaining small exports of fresh pineapples and mangoes was identified and technical information and business advice was provided to the growers, exporters, and FPX Product Managers.

Contacts were made with other persons capable and willing to assist in the development of post-harvest and marketing capabilities with FPX, such as Jack Case of the Brogdex Company, and the Viking Fruit Company. Considerable enthusiasm was noted from all people contacted regarding the development of non-traditional agricultural exports from Honduras, especially in tropical fruits.

The groundwork has been laid for FPX to begin specific actions to develop and assist export projects in pineapple and mangos, with attainable results closely matching their 1989-90 work plan. Continued technical and business advisory services will be needed by FPX throughout this calendar year until sufficient knowledge and experience has been gained by the both the FPX management and the producers/exporters in Honduras.

B. Recommendations

Most of the following recommendations, but not all, were discussed on Monday morning, January 29 with Sr. Miguel Angel Bonilla and Sr. Medardo Galindo of FPX.

1. FPX must demonstrate and prove its' credibility and capability with producers, exporters, and other Honduran institutions to achieve results in the development and marketing of non-traditional agricultural exports, especially in products other than shrimp and melons. There still exists some doubt by certain of the above mentioned groups of FPX's ability to perform.

2. FPX must be more forceful in establishing its' role in assisting export development. It must work closely with producers and exporters to define problems and solutions. FPX must call on consultants, FHIA, and PROEXAG to assist in solving technical problems. Constant and continued follow-up and involvement by the Product Managers in developing export projects is necessary.
3. The management of FPX should be aware of the urgency for, and emphasize to its Board of Directors, the necessity to become directly involved in export development projects in an equity and advisory role. Some recommended projects to pursue are:
 - a) Establishment of a Smooth Cayenne variety pineapple nursery in the Lake Yojoa area by purchasing the 30,000 smooth cayenne seeds available from the Chumbugua farm and converting the 50,000 plants of Carlos Fernandez to seed production.
 - b) Pursue export of Montufar (Sugar Loaf) pineapple with the General Products Trading Company. Perform research on the post-harvest aspects of successfully accomplishing this goal, utilizing this consultant as project leader.
 - c) Investigate the possibility of a joint venture pineapple project between FPX, General Products Trading Company, and the Pajuiles Cooperative.
 - d) Promote and advertise the available expertise in pineapple production and shipping to current growers.
 - e) Pursue an assistance program with the Suarez/Miselem mango group for post-harvest technical assistance and possible marketing through the Viking Fruit Company. Experience should be developed to market fruit shipped by ocean freight. Study a possible minor equity investment in this group to promote expansion and improvements to the mango industry in Comayagua.
4. Foster an improved relationship between FPX and FHIA, possibly utilizing the PROEXAG group, to develop closer communications and a definition of each institutions role in the establishment of an expanded non-traditional agricultural export program. Leverage the attitude of the new FHIA Research Director who favors separation of responsibilities by utilizing the strengths of each organization, i.e. FHIA in research and production and FPX in post-harvest and marketing technical assistance. Meet soon to identify 3-4 key projects where cooperation can begin.

5. FPX should avail of the extensive experience and knowledge of the PROEXAG group in providing technical, financial, organizational, and marketing assistance support to FPX.
6. PROEXAG, if appropriate, should perform an evaluation of the progress to date of the FPX institution in achieving the goals of its fiscal year work plan. I recommend an evaluation of the current organization and personnel in relation to the above issue.
7. Consider the possibility of merging the institutions of FPX and FHIA into a FHIMA (Federacion Hondureno de Investigacion y Mercadeo Agricola) to eliminate overlapping and conflicting responsibilities, while reducing overhead and funding requirements by USAID. Comments and suggestions on this topic are available from the consultant upon request.