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Report To:
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SEED PROGRAM/INDUSTRY IN PARAGUAY

Marketing to Small Farms and Program Review

Services Rendered
Under The Cooperative Agreement
Between
AID/W and MSU
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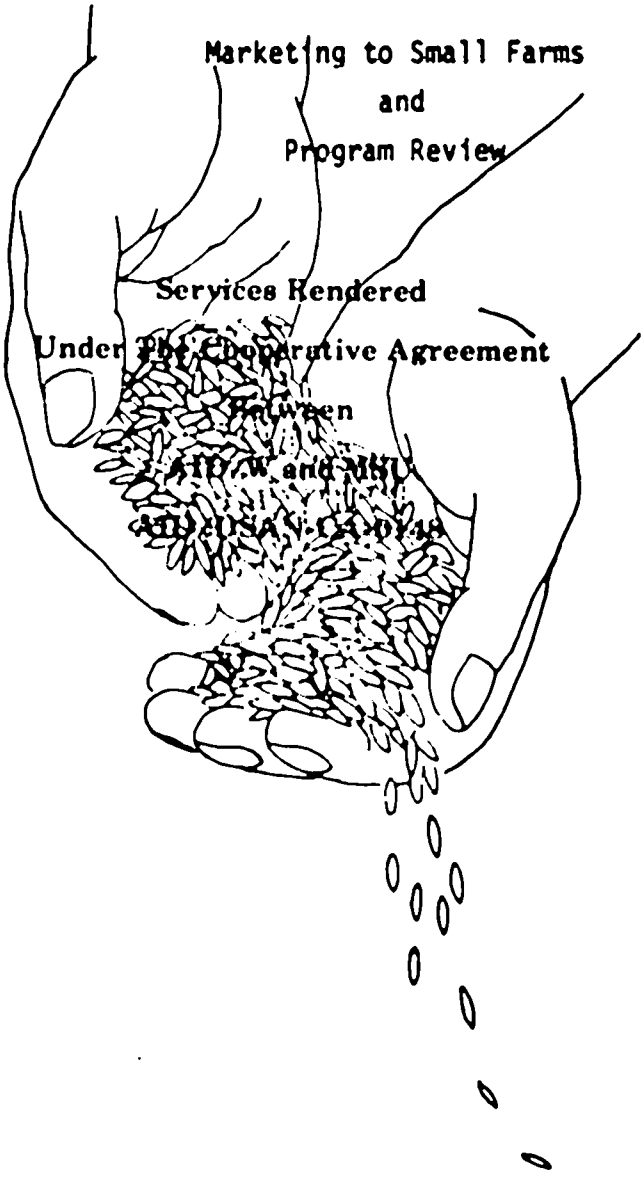

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REPORT TO:

USAID/PARAGUAY, AID/W and SENASE/MOA

on

SEED PROGRAM/INDUSTRY DEVELOPMENT IN PARAGUAY

Marketing To Small Farms (PIPA)

and

Program Review (SENASE)

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Cooperative Agreement
between
AID/W and MSU
(AID/DSAN-CA-0148)

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REPORT SUMMARY

TITLE: Seed Program/Industry in Paraguay: Marketing to Small Farms and Program Review

CONTRACT: AID/DSAN-CA-0148 with Mississippi State University

CONSULTANTS: Dr. Howard C. Potts and Mr. Edgar Cabrera
Seed Technology Laboratory, MAFES,
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PERIOD OF CONSULTATION: February 11-29, 1980

SUMMARY

The USAID/P Mission requested technical assistance from this Cooperator for the purpose of (a) developing the seed marketing program to support the objectives of the USAID funded, Small Farm Technology Project, (b) assisting the National Seed Service (SENASE) to review and make recommendations concerning its technical program and (c) assist the USAID/P in the development of specific terms of reference for a needed consultant for the "Mimifundia" project. Dr. Howard C. Potts, Senior Seed Technologist and Mr. Edgar Cabrera, Seed Processing Engineer provided the requested services.

The Seed Marketing Sub-Project of the Small Farm Technology Project (PIPA) will be implemented by the SENASE in cooperation with and under the administrative leadership of the National Agricultural Extension Service (SEAG). The PIPA project is to be implemented over a five year period in seven selected zones within each of which there will be from 5 to 9 SEAG agencies and will serve approximately 50,000 of Paraguay's small farmers.

The marketing plan accepted places responsibility for estimating the actual demand for PIPA seed with the SEAG, initially. The SENASE will be responsible for accumulating the seed necessary to meet the estimated demand for each variety of corn, cowpea and English pea seed which are to be made available in 5kg bags.

The SENASE will be responsible for selecting and developing a network of retail seed dealers to assure the availability of seeds of traditional varieties at the local level. The dealer network will overlay the network of SEAG agencies and follow the same implementation schedule as the overall project. A coordinated SENASE/SEAG seed promotion and advertising program will be developed and implemented. Logistically, a two stage distribution system; SENASE to authorized PIPA seed

dealers to target farmer will be followed. The utilization of "acopidores" and cooperatives as retail seed dealers, rather than government agencies, to sell seed at the same margin as other small-farmer supplies but at a monitored maximum price is one of the unique features of this program. Budgets, implementation plans and spacial distribution maps are included for the seed marketing sub-project.

The review of and recommendations for the national seed program are made as a follow-up visit to that made by the senior consultant in 1972. The SENASE has made excellent progress in the development of seed testing drying, processing and storage facilities and in the utilization of the new facilities. Two major impediments to continued rapid development of Paraguay's national seed program exist. These are (a) the lack of an organized program at the research level provide for a continuous influx of seed of high genetic purity into the multiplication program and (b) the lack of technical personnel with in-depth professional training and experience in seed technology and program development. The latter impediment will be partially resolved with the return of the first post-graduate seed technologist in December.

The SENASE's seed drying, processing and storage facility at San Ignacio is in need of numerous alternations, most of which are minor, to resolve operational problems and improve the effeciency of its operation and maintence. Specific recommendations are made.

Specific terms of reference for the consultant for the "Minifundi" project were developed and have been forwarded to the Paraguay Desk Officer, AID/W, along with the names of two potential consultants.

Howard C. Potts

Edgar R. Cabrera

Acknowledgements

The authors are particularly grateful to Dr. Larry Laird, RDO, USAID/P and Ing. Ramon Artecona, Director, SENASE/MAG for their hospitality, complete cooperation and open discussions of the problems related to development of Paraguay's seed program.

To Ing's Jose Maricevich and Baldomero Valinolti of SENASE, who were especially helpful in accumulating data and information concerning the technical aspects of the national seed program as well as being most hospitable hosts and guides during our field trip, we extend our thanks.

We also appreciate the time and helpful suggestions given by Ing. Juan Molinas and Ing. Wildo Perez W. of SEAG toward the development of a rational seed marketing program for the PIPA.

Finally we want to acknowledge the assistance of Sra. Corina Cazanave, RDO secretary; Oscar Carvallo, administrative assistant, RDO, and Tona, USAID "snack shop" for the many favors which made our work easier and more enjoyable.

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1.0 INTRODUCTION

A well organized, effective seed program/industry is as important to continued agricultural progress as are programs for supplying credit, mechanical equipment, fertilizers and pesticides. In Paraguay, the seed program is even more basic to agricultural progress because, unlike other production inputs, seeds of the increasing numbers of the truely superior crop varieties, adapted to Paraguayan conditions, are only produced in Paraguay. This trend will continue as the national crop research program continues to develop.

The National Seed Service (SENASE) of the Ministry of Agriculture and Livestock (MAG) is the most dominate seed organization in Paraguay. The SENASE has responsibilities in every aspect of the seed industry: production, certification, processing, sales, distribution, regulation, and education. This organization was re-organized in 1971 and has made significant progress since 1972 with support from the Integrated Agricultural Development Projects, PIDAP-1 and PIDAP-2. (Readers should refer to the MSU technical report, TA 72-9, for historical background of Paraguay's national seed program/industry). The current situation of the Paraguayan seed program is presented in Section 3.0 of this report.

1.1 Terms of Reference

The assigned terms of reference for this consultation were as follow:

a. To work with the National Extension Service (SEAG) and SENASE technicians to develop a seed marketing program with the capacity to make available high quality seeds of known varieties to small farmers at village level under the small farm technology project (PIPA). (Section 2)

b. To assist the SENASE and MAG in reviewing and updating its overall program. (Section 3 and 4)

c. Develop specific terms of reference for a tropical fruit propagation consultant and assist USAID/P and AID/W in securing the services of a qualified consultant.

The Contractor nominated and the Project Manager approved Dr. Howard C. Potts, Senior Seed Technologist, and Mr. Edgar Cabrera, Seed Processing Engineer to provide the requested services. The consultants departed Mississippi State, MS. on February 11 and returned February 29, 1980.

2.0. SEED MARKETING/SMALL FARM TECHNOLOGY PROJECT (PIPA)

The GOP and USAID/P are cooperating in a project (#526-0109) which will enable the MAG to address the prinicpal constraints - inadequate research, extension, intermediate technology and marketing services - which inhibit the small farmer from increasing his income and employment. A summary of the overall project is provided as background.

2.1. Background - General

The productivity of small farm agriculture in Paraguay has been virtually stagnant in recent years. The productivity of Paraguayan agriculture, in general, is below the average for Latin America as a whole, and small farm productivity is below the national average. Increases in output in the sector as a whole, and particularly in the small farm subsector have been the result, principally, of increased use of basic resources in relatively constant proportions. Yields per hectare show no correlation with farm size. These facts demonstrate that the technology of small farm agriculture is stagnant. The objective of this project is to launch an attack on this technological constraint.

With the technology currently in use on small farms the limiting factor is labor. Farm households with holdings of more than three hectares are unable to cultivate the lands they have. Technologies which improve the productivity of labor will enable small farmers to utilize their available land more extensively and efficiently.

This project proposes to disseminate improved technologies to about 50,000 small farmers in selected minifundia areas to increase yields and raise labor productivity. Coverage is generally expected to increase threefold from current levels of around 20% (including indirect or spread effects) to over 60% of the farm population in the target regions.

These technologies will, with the cooperation of participating farmers, be field tested on small farms in the project area and will be analyzed and evaluated in the context of the whole farm operation. Mass media techniques will be used to disseminate the knowledge which small farmers determine to be adaptable to their production systems and conditions. The National Extension Service (SEAG) currently has 77 local field agencies, of which 31 are in the Project area. By the end of the Project, 43 of a projected 90 local field agencies of SEAG will have been incorporated in a regional center network structure.

To achieve these objectives the project will undertake a phased creation of local delivery networks consisting of 43 small farmer service units supported by seven strategically placed regional development centers of SEAG. The project will also support three activities that are independent of SEAG but directly related to its needs: (i) creation of a modest research capacity in the Ministry's National Agro-Mechanical School, to study and develop mechanical innovations especially suited to small farm needs; (ii) establishment of a "revolving" fund (US $450,000) in the National Seed Service, (SENASE) to pay for the costs of contract growing, preparation and distribution of seeds appropriate for small farmer use; and (iii) support research efforts on non-traditional crops potentially suited to small farmer production.

The emphasis of this Section (2.0) is to provide a detailed outline of the seed marketing program necessary to implement item (ii) above,

the details of which were intentionally omitted from the Project Paper. It is important to note that, to date, neither the USAID nor any other technical assistance organization has a successful model for marketing seeds of traditional varieities of self-and open-pollinated crops to small farmers (5.3 ha or less in crop culture).

2.1.1 Background - Seed Marketing Sub-Project

The PIPA project paper establishes the general implementation plan for the total project, therefore, the seed marketing sub-project is committed to be supportive of this plan. Basically, seven specific zones were identified with project implementation planned for three zones the first year (1980) and two additional zones in each of the two following years. The scheduled phasing by zones and the potential beneficiaries in each zone are presented in Table 1. The overall project hopes to influence the practices of 60% of the farmers in the target zones.

Initially only high quality seeds of corn, cowpeas and English peas will be distributed through the PIPA. These basic food crops are planted on slightly more than one-half of the crop land of the small farms. The balance of the crop land on the average small farm is planted to mandioca (for food) and cotton or soybeans (cash crops). A list of the species and varieties to be utilized initially in the PIPA is given in Table 2.

In general, small farmers rarely purchase seeds of those food crops which they can save by traditional selection and storage practices. On the other hand, small farmers will purchase seeds of varieties truely superior in performance characteristics of importance to their survival; i.e. improved taste, better cooking quality, more stable yield from year to year with a minimum of chemical inputs, distinctly higher biological and genetic quality.

The farmers in Paraquay appear to fit the general pattern with reference to their seed saving practices as evidenced by the data presented in Table 3. To properly evaluate the data presented in this table one must be aware that soybeans and wheat are primarily "large" farmer crops, many commercial farmers plant hybrid corn seed and all cotton seed is controlled by the Cotton Growers Assn. (OFAT).

Because the SENASE is the official government agency responsible for most aspects of the national seed program, the major exception being varietal development and maintance, it is logical that it was selected as the implementing agency for the seed marketing sub-project of the PIPA. Nevertheless, the SENASE has very limited experience as an active marketer of seed. Thus, the details of the seed marketing program which follow includes both technical and instructional information concerning the functions of seed marketing as specifically applicable to the PIPA.

Table 1. Implementation schedule, farm numbers and estimated crop area in the seven target zone of the PIPA.

Implementation YEAR	ZONE	Total	Land Used for 1/ Crop Culture (ha)	Target Area	Target Area in Crop Culture (ha)
1	Paraguari	18,066	72,264	10,840	43,358
1	Encarnacion	14,351	57,404	8,611	34,442
1	Cordillera*	17,233	68,932	10,340	41,359
2	Neembucu	7,229	28,916	4,337	17,349
2	Central*	12,273	49,092	7,364	29,456
3	Caaguazu*	17,375	69,500	10,425	41,700
3	Caazapa	9,619	38,476	5,771	23,086
	Total	96,146	384,584	57,688	230,759

1/ Basic data from project paper. Land used for crop culture is based on an average of 4 ha./farmer of which 1.5ha is devoted to maiz (corn), 1.0 ha to poroto (cowpeas) and in zones indicated * 0.25ha of arveja (English peas).

Table 2. Species and varieties to be multiplied by SENASE for use in the PIPA.

Species	Varieties 1/
Maiz (corn)	Venezuela 1 (synthetic) Harinoso
Poroto (cowpeas)	San Fransico Colorado
Arveja (English Peas)	Cuarentona

1/ Genetically pure seeds are not readily available except for Venezuela 1 which is reconstituted periodically at CRIA.

Source: SENASE/SEAG

Table 3. Farmer's sources of seed of the major seed propagated crops in Paraguay (1975).

Crop	Seed Source (%)	
	SENASE	Farmer Saved
Corn	2 1/	98
Soybeans	10	90
Wheat	40	60
Rice	4	96
Cotton	100	0
Vegetables	4	96

1/ Unsized seed packaged in 50 kg bags, does not include hybrid seed imported from Brazil and Argentina.

Source: Small Farmer Sub-sector Assessment and Constraints Analysis. USAID/P August, 1976.

2.2 Introduction to Seed Marketing Sub-Project

Because good seed of superior varieities must be,not only available but,used by many farmers to influence agricultural productivity, seed marketing focuses upon the user (farmer) rather than the product (seed). The establishment of a seed marketing program that effectively brings together the seed and the farmer-consumer is a challenging task.

A successful seed marketing program requires personnel with specialized training and expertise which are not normally found among agricultural technicians responsible for other aspects of the seed program. Personnel assigned to the seed marketing programs need knowledge of human relations, communication, marketing techniques, logistics, and business management. Failure to appreciate the differences between the technical requirements for varietal development, production and regulation and those required for marketing is a major reason for failures in seed marketing ventures.

What is seed marketing? It is a continuous and systematic (a) determination of the farmer's seed needs, (b) accumulation of the seeds and services to satisfy these needs, (c) communication of information to potential farmer-consumers about the seeds and services available and from the farmer-consumers concerning the results of having used the seeds and services, and (d) distribution of seed to the farmer-consumers. Fulfilling the responsibilities entailed by these four functions of seed marketing requires year around action by those responsible for the program's success.

Thus, the minimum personnel inputs for the PIPA/SENASE seed marketing sub-project are a Marketing Manager, an accountant and a secretary. Because the scope of the program is rather modest the personnel assigned will not be required,initially,to utilize 100% of their time on seed marketing activities, however at least for the marketing manager, marketing activities must receive the first priority among his responsibilities!

2.3 Determination of Consumer Needs - Market Research

The perceived demand and the actual demand for seed are not the same. Frequently, plant breeders, information and promotion personnel, and administrators perceive a demand for seed without sufficient reliable information. When seed is produced without a realistic assessment of actual demand, serious over-production or under-production can result. Seed enterprises, other seed dealers and public sector organizations need information provided by seed market research to develop an effective seed marketing program.

Market research is the systematic gathering of information concerning the target farmers' needs, desires, and buying habits; number of potential farmers with the needed buying power, and alternative sources of seed available to the farmer-consumer. The information gathered can be analyzed to predict current and future needs of the target farmers and the organizational activities necessary to meet their needs.

The ultimate purpose of market research is to establish a realistic, specified set of goals or sales estimates. Having established these, planning for accumulation of seed stocks, communication and promotion, means of distribtuion, and the budget for each activity is based upon attaining the goals. The primary goal of the SENASE/PIPA seed marketing sub-project might then be expressed as follows: "To sell "X" kilos of seed of maize varieties A, B, and C". Success in production and marketing will depend upon the accuracy of the estimates of the actual market demand.

2.3.1. Assessing Demand

Assessing market demand is not easy. Market demand is the total volume of a product which will be bought by farmers using specific technology in a defined location, within a specified period, and with a certain marketing effort. This definition places the following restrictions upon the concept of market demand.

a). Product refers to the specific item for which the demand is determined. i.e., crop, variety and quality level of the seed. For example, a difference will exist between the demand for Venezuela1 maiz seeds as compared to the demand for Harinoso maiz seeds.

b). Bought refers to the desires of the farmer who can and will pay for the seed. In seed marketing, it is the farmer who 'buys' the seed that initiates the actions which justify all other aspects of a seed program, i.e. varietal development, production, processing.

c). Technology dictates that the concept of demand must consider the situation in which the seed will be used. For example, changes in demand for seed of one variety may occur because of the availability of other inputs (fertilizers) or other technical advances (mechanization).

d). Location imparts a geographic dimension to the concept of demand and assumes that demand for the seed of different varieties or kinds will vary geographically. English peas (arveja) is a good example.

e). Period relates to the length of time that the demand will exist. The dates for planting some improved varieties or new crops may be restricted when compared with traditional varieties or crops. Weather patterns,establish in many areas,the range in days that crops can be planted or grown with success.

f). Marketing effort recognizes that market demand can be influenced by promotion campaigns, distribution efforts, and price.

Practically stated, farmers only buy a variety of seed when they know the variety exists, seed are available, they have the resources to pay for the seed, and they believe the variety will benefit their operations.

2.3.2. Forecasting Market Demand

Forecasting market demand basically takes three forms: what people say, do, and have done.

a). What people say.

The methods used to determine the demand forecast from what people say are: (a) survey of buyers intentions, (b) the composite opinion of the seed vendors, and (c) the "expert" opinion.

Since buyers actions are what a demand forecast attempts to measure, one method is to ask the potential buyer. This method is practical for a farmer-seed grower who sells to his neighbors, retail seed dealers, and seed wholesalers such as SENASE.

Under the PIPA, the SEAG initially has been assigned responsibility for estimating the demand for seeds of the target crops; corn, cowpeas and English peas. Plans have already been formulated for a direct survey of the farmers in the target zones to be conducted during July-August,1980. This is a most realistic approach for estimating the demand at present,since there is neither prior sales data nor an established seed marketing system at the small farmer level in Paraguay.

After the PIPA has been in operation for a few years and both sales records and the marketing-distribution system is established, less expensive and equally accurate means for estimating demand can be used. At that time responsibility for estimating the demand should be assigned to the SENASE which could then use some combination of the techniques which follow.

The composite opinion of seed dealers for making demand estimates is based upon judgment of what each dealer believes can be sold in his local area. This method readily provides estimates separated into the kinds and varieties of seed, the time they are needed, the area of use, customer characteristics, and level of marketing effort required--the components of market demand. Seed dealers have more knowledge and insight of the real market conditions than any other group. Because seed marketing personnel participate in this forecasting process, they have greater confidence in the estimates and this increases their incentive to make the estimates, realities.

Utilization of this technique during the early stages of a seed program's development depends on the extent to which: (1) the marketing manager and seed dealers are the most knowledgeable source of information and are willing to cooperate, (2) the estimates are unbiased or biases can be corrected, and (3) the personnel involved recognize the need for demand estimates.

The "expert opinion" method works well only after marketing activities are well developed. It is essentially a poll of informed people which utilizes few facts, places little responsibility on the estimator

and is most reliable when used for forecasting total needs rather than those of specific operations. This method is best used to determine trends in crop acreage and yield levels. Unfortunately, it is the most often used method for establishing specific goals in developing seed programs but is not recommended for the PIPA except for estimating the demand of any seed that might be distributed in 1980, where there is no alternative method available.

b). What people do.

The test of what people do is the most useful technique applicable for estimating the demand for the services associated with seed sales. This method measures buyer reaction under actual marketing conditions. Its primary utility rests with the acceptability of the seed or service to be marketed rather than the kind or variety of seed. For example, market tests may be conducted to determine consumer preference for container size, the effects of size grading maiz seed, or acceptance of enclosing seed treatment materials in each bag of seed.

In the successful "hybrid corn seed marketing" program in Kenya, the best approach was a type of "trial marketing". This method used was to make seed abundantly available in the target area. The actual purchases by the farmers, gave a better insight of the demand than any other method, until the sales statistics became available after several years of operation.

c). What people have done.

This method is based primarily upon historical data and is the most widely used method for forecasting demand by established seed enterprises. It is not applicable for a beginning seed program, but it becomes increasingly useful as accurate sales data are accumulated. Two techniques are used to develop forecasts from data of past performance--time series analysis and statistical demand analysis.

In a time series analysis it is assumed that what people have done in the past is an expression of what they will do in the future. Two major limitations weaken the reliability of this technique: availability of historical data and the high probability of change when new varieties are introduced.

Statistical demand analysis attempts to determine the direct relationship between use and the components of market demand. This technique can identify the relationships among the various demand factors, i.e. "What effect will the introduction of a new variety at a higher price have on the use of a current variety?" It is centered around a statistical technique called regression analysis and will not be practical for Paraguay in the forseeable future.

2.3.3. Use of the Demand Forecast

Everyone responsible for producting or marketing seeds needs reasonably accurate forecasts of the seed demand by varieties for planning purposes. During the initial five to ten years of operation, demand forecasts are most accurately determined by one of the techniques described under the method "What people say". The principal problem, however, is that the decision concerning the specific varieties to grow must be made as much as two years before and at least one season before sales are to be made.

All persons selling seeds, informally and continually, survey their customers buying intentions and accumulate stocks to supply these needs. Seed dealers who have several sources of supply can be effective by forecasting their needs a few days or weeks ahead of the actual sale. On the other hand, organizations such as SENASE which will be directly linked to the production phase must have a demand estimate at least one season ahead of the planned sale. As indicated on the Time Phased Implementation Plan (Appendix I) the SENASE must have the demand estimate for English peas to be sold in 1981 by March 1980, etc. Organizations like SENASE, selling in more than one locality, must develop an intensive and formal means of making the demand forecast to the minimize risks which are initially being covered by the "revolving' fund.

When competition among seed dealers exists, the importance and needed accuracy of the demand estimate increases as each competitor attempts to gain an increasing percentage of the business. A gross under- or over-estimate of either the demand or sales will quickly eliminate the poorer estimator, when total seed supplies are adequate. Demand estimates are assigned a lesser importance when a public or private monopoly exists such as for the PIPA,but this often results in decreased efficiency of operation. This was the principal justification for establishing the "revolving" fund.

The demand forecast should indicate what seed and what varieties are in demand, how much, where, by whom, when, and at what retail price the demand exists. With this information it is possible to organize production and marketing simultaneously and provide specific answers to the following questions: (a) What varieties to produce? (b) Where to produce? (c) How much to produce? (d) When to produce? (e) Where to store? (f) How much to store? (g) What to promote? (h) How to promote? (i) When to distribute? (j) How to distribute? (k) At what price to sell? These questions must be answered from the results of the SEAG demand survey.

In lieu of any type of demand estimate but to permit preparation of the needed budget estimates for each of the five years of the PIPA seed marketing sub-project, (Appendix II) the estimated seed usage (sales) are summarized in Table 4 and were based on the following assumptions:

(a). Starting the second project year, 5% of the target area farmers (60% of total) would purchase 5 kgs of maize seed, 2% would purchase 5kgs of cowpea seed and 2% of the farmers in some zones

Table 4. Estimated Actual Demand for Seed under the PIPA SENASE Seed Marketing Sub-project (kgs)

Crop	Project Year				
	1 (1980)	2 (1981)	3 (1982)	4 (1983)	5 (1984)
Maiz	no seed available	7,445	11,115	16,280	17,905
Porato	no seed available	2,980	4,455	6,525	7,175
Erveja	no seed available	1,035	1,580	2,580	3,060

would purchase 5kgs of English pea seed. The market in each zone would expand at the average rate of 10% each year for each species up to a maximum of 10% of the total market for corn and 5% for cowpeas, English peas or other self pollinated food crops.

(b). Farmers would not be required to purchase "PIPA" seed to qualify for a production loan.

(c). The retail price of seed at the local level would not exceed two times the grain market price of corn or one and one-half times the grain market price for cowpeas or English peas.

(d). The germination and appearance of the "PIPA" seed would be significantly better than farmer saved seed of the same crop.

(e). The local seed dealers will effectively market "PIPA" seed at a margin no greater than 40% above their delivered cost.

(f). The SEAG/SENASE promotion effort is near normal in promoting acceptance of high quality seed of traditional varieties.

2.4 Accumulation of Seed Supplies

The second major function of seed marketing is to determine where, how much, and by whom the estimated quantity of seed to be sold can be obtained. Two alternative sources of seed exist for SENASE.

a). Seed produced by or for SENASE, under contract, or

b). Seed produced by or imported from suppliers not associated with SENASE.

Often accumulation of the seeds to be sold involves a combination of the two sources of supply indicated above, depending upon the crops involved. Since there are no known alternative, commercial sources of seed for the varieties to be utilized in the PIPA, the SENASE will be responsible for producing the needed quantities of each variety each year. The production each year will be based upon SEAG's estimate of demand under terms of the convenio between SEAG and SENASE.

At present, neither of the national research organizations has or maintains a supply of pure seeds of the varieties to be utilized by the PIPA. Thus, the SENASE must make the necessary arrangements not only for seed multiplication but for purification of the selected varieties. Multiplication should be made under contract with existing seed producers who have all the facilities necessary to plant, harvest, dry and deliver the seeds in a timely manner following the system presently utilized by SENASE for corn and wheat seed.

The purification of the two varieties of cowpeas and one variety of English peas can most readily be accomplished by following the mass selection technique for self-pollinated species as outlined in most

texts which discuss methods of plant breeding. Particular emphasis must be placed upon selecting plants which are the same in the following morphological characteristics: leaf shape and color, date of flowering, flower color, plant type (erect, spreading, etc.), seed color, and maturation date.

Purification and/or reconstitution of the two varieties of open-pollinated corn represent a much more difficult problem for the SENASE. This will require cooperation of the corn breeder located at CRIA (Capitan Mirandia).

Multiplication and subsequent marketing of seeds no better in genetic purity than those which the small farmers have on hand (farmer-saved seed) will have a dramatically depressing, probably disasterous, effect on the seed marketing sub-project of the PIPA.

Responsibility for the accumulation of the necessary quantities of seeds of the desired varieties rests primarily with the production section. However, the SENASE marketing manager must communicate anticipated requirements (kind, variety, quantity, and quality of seed needed) to the production section sufficiently in advance of the production season to permit the seed to be produced and prepared for marketing. As the seeds are made ready for marketing, the processing section must inform the marketing section of the exact quantity and quality of each variety available.

An effective internal communication system between the production and marketing sections is essential to all seed enterprises, small or large. The SENASE Director must place a high priority on this link. This essential task is more difficult when several locations are used for growing and storing seed supplies of a large number of different varieties.

Though not directly a part of the PIPA, the SENASE should be aware of the opportunity to utilize the sales and distribution system, which it must establish under the PIPA, as a means of supplying seeds of other food crops, particularly vegetables, to the small farmers. Although, such activities could be viewed as being directly competitive with the private sector vegetable seed importers, to date none of the private sector organizations service the small farmers will small packets (5-50g) of vegetable seeds.

Because of the climatic conditions in Paraguay, in country production of most vegetable seeds is not feasible. Currently, the SENASE imports and sells more than 1,000kgs of a wide variety of vegetable seeds each year, through their retail outlet office in San Lorenzo. It is suggested that if sales and distribution of vegetable seeds is extended to the PIPA small farmer zones, that the seeds, which are all imported in vapor-proof metal cans, be repackaged in vapor-proof plastic bags of at least 10 mil thickness prior to redistribution. Provided repacking is accomplished rapidly (within eight hours after a metal can is opened) and the packages are properly sealed, the seeds should have a shelf life

of approximately 30 months from the date the seeds were originally packed in the metal cans. Economically, the profit made from the sale of vegetable seed would help offset the anticipated losses from marketing seeds of the basic food crops to small farmers.

2.5 Marketing Communications

The SENASE must develop and maintain continuous, two way communication with the seed consumers. The seed can be of high quality, a superior variety, priced right, and distributed through effective dealers, but it may still not be sold because of ineffective communication with potential buyers. Either the SENASE or PIPA needs to establish their name with the target farmers. It would be desirable for the PIPA to develop a symbol or logo to indentify all phases of its program, including seeds. Even when a symbol or a variety is well known, persuasive communication to present and potential customers is essential. When effectively planned and coordinated, marketing communication vitalizes the sales effort, builds the morale of salesmen and dealers, and encourages the farmer to buy. Market communications is divided into four activities: promotion, public relations, selling, and dealer development.

2.5.1 Promotion

Promotion is the stimulation of demand. Specialized personnel are needed who can translate technical information into practical terms for potential customers so as to encourage them to react in the desired manner. The creative use of promotional materials and publicity is vital to successful seed marketing and is a responsibility of both SENASE and SEAG.

Promoting both the symbol and the superior qualities of the seed is a normal marketing practice. The SENASE should develop promotional materials and share in the dealer's publicity efforts. Dealers can adapt materials supplied by the SENASE and SEAG to their specific needs. Specific funds have been included in the budget estimates to cover the costs of various types of promotional materials which would be distributed through the authorized PIPA seed vendors. Informational material prepared by the SEAG should be used by all organizations involved in the PIPA. The effectiveness of the total effort is increased when the public educational activities and the promotional work of marketing programs complement one another.

Administrators and the marketing manager concerned with promotion and publicity should approve promotional plans, provide the budget for its implementation, and effectively promote the project and its seeds.

2.5.2 Public Relations

Public relations are those activities designed to create a favorable impression of and trust in the SENASE and the individuals who work for it. Such an impression should be reflected by everyone in the

organization including the dealers. Honesty and friendliness are key characteristics. Results of several marketing studies revealed that more than 80% of most organization's repeat sales were attributed to organizational reputation, employee morale, and farmer confidence in the organization, technical attributes accounted for only 20% of the repeat sales.

All personnel, especially administrative, play a critical role in building and maintaining good public relations. The courtesy of employees and their use of efficient procedures are vital. Support of service and community improvement projects, informal meetings with public officials and business leaders, and a cooperative attitude in meeting various requests are effective means of improving public relations. This is particularly true for the dealers working directly with the farmers. Cleanliness and maintenance of facilities and surrounding grounds help to establish a favorable image.

In successful seed marketing organizations, administrative policies concerning public relations are established early and rigidly enforced. What small farmers see often has a much greater influence on their opinions than what they are told.

2.5.3 Selling The Seed

The ultimate objective of all activities in a seed program is to get the seed used. No country can continually provide farmers with free seed; all seed must be "sold." There is a significant difference between selling seed and having seed for sale. Selling is actively searching for a buyer, convincing him of the value of the seed, and exchanging seed for money or other goods.

The art of selling and successful techniques are described explicitly in many publications. As an example, successful selling can be observed in any village market. The six essential characteristics of selling are used by every successful vendor who: (a) attracts potential buyers, (b) appeals to the buyers' need for the product he has available, (c) establishes direct contact, in this example verbal, (d) makes the sale through knowledge of the product, (e) helps the buyer recognize the product's value, and (f) gives the buyer as much service as required, perhaps including granting or arranging credit. The marketing manager should stress these characteristics of selling with the PIPA seed dealers. SENASE personnel, working to get more seed used, should establish policies and programs to assure that sales personnel understand and effectively use these "key" characteristics which are described below:

(a). Attraction - Efforts to attract buyers should include information about what seed is available, where it can be purchased, and, usually, why they should be purchased from a particular seed vendor.

(b). Availability - The physical presence of the seed within the transport range of the farmer assures availability. A subsequent section,

(2.6) discusses distribution in greater detail, because lack of availability is a major impediment to increased seed use in most developing seed programs.

Getting improved seeds within walking distance of tens of thousands of small farmers poses a problem. The Kenya Seed Company which sells hybrid corn seed found some answers by observing the marketing and distribution techniques of the beer and cigarette companies, which had their products readily available in small shops in every village. The breweries and tobacco companies attributed their success to the following policies; all sales for cash, an attractive margin for the dealers, and rapid resupply of their products.

The Kenya Seed Company, with 40 wholesale distributors, made it easy for each dealer to replenish his seed stocks quickly. Each retail dealer had to buy a minimum of 10 bags of seed of 10 kilos each. In the weeks ahead of planting, many dealers had to be resupplied two or three times a week. Seed company salesmen continuously visited the wholesale and retail vendors at planting time to kept supplies moving. They selected one to three shopkeepers in each village to encourage competition, but not more than three to avoid excessive competition and reduce the dealers' incentive. Dealers were selected on the basis of their effectiveness in selling seed and other products in their local area. The PIPA seed program does not have the sales potential of Kenya Seed Company's hybrid corn program, however, the Kenyan small farmers are just as poor and traditional as those of Paraguay.

(c). Direct contact - Rarely are seeds purchased without the farmer talking to the sales person. Direct contact permits the farmer to establish the degree of confidence he will place in the seller. Farmers often prefer to buy seed from a relative or neighbor rather than from someone they do not know, even at some sacrifice in true value of the seed supplied.

This "need to know the salesman" often works to the disadvantage of city reared, government employees involved in seed sales. The technician's economic and social interests are frequently not associated with those of the rural people they are trying to serve. This fact is readily recognized, though rarely stated, by the small farmer.

(d). Knowledge of the product - A major constraint to seed sales is the lack of the retail dealer's personal knowledge of how each variety performs under local conditions. The two most important characteristics of any seed--genetic potential and viability--cannot be readily determined by the farmer in his effort to decide whether they are worth the price requested. The farmer will not know the full value and quality of the seed planted until the resulting crop is ready for harvest. If the seed didn't have the qualities hope for, its too late. Thus, the dealer must be well informed about every variety that he sales. Supplying the dealers with needed information concerning varietal performance is a responsibility of research, SENASE and SEAG personnel. Funds are

budgeted for dealer training schools as one means of providing the local dealers such information.

The marketing manager and retail dealers who are in contact with potential customers should attend crop demonstration field days, consult research and extension personnel, and ask the farmers who purchase seed of each variety about its advantages and disadvantages. This personal knowledge of the performance characteristics of each variety is a service to other farmer's interested in buying, extension agents and research personnel. Generalities about varietal performance will not suffice! The SENASE must develop a system to have this information communicated back to them from every dealer.

(e). Value - The price and value of a bag of seed are in reality contrasting opinions of the seller and buyer, respectively. Price is the seller's concept of the value of the seed and services offered. Value is the buyer's perception of the benefits he will realize in exchange for his money or goods. Only, when the farmer perceives the value exceeds the price is a sale made,unless the farmer is forced to purchase seed to gain other benefits on which he places a greater value than seed.

Most Paraguayan farmers save seed or buy from their neighbors because they are not convinced of the benefits to be derived from using good seed of superior varieties sold by others. For many years the opinion prevailed that the "poor, traditional farmer" could not pay for "high priced" seed. "Seed must be given away" was the belief of many planners. Extensive purchases of seed of the high yielding rice and wheat varieties at prices two to ten times those of the traditional varieties have destroyed this theory. Of greater significance, these events vividly demonstrated farmer understanding of "price-value" or "cost-benefit" relationships regardless of their level of income or education.

A major impediment to economic viability of the PIPA seed sub-project is the fact that the varieties to be supplied are traditional varieties of open- and self-pollinated crops. All of the farmers under the PIPA already have seeds of the varieties to be distributed, although the quality of the farmer saved seed is or should be lower than the PIPA seed. This fact will result in a low level of farmer acceptance which greatly magnifies both the direct and indirect costs of marketing and will require the indirect subsidy of retail price suggested for the PIPA seed.

Technical benefits which can be derived from using good seed of superior varieties include: increased knowledge about purity and germination, better stands, less contaminating weed seed, reduced susceptability to insects and diseases, and increased yield potential.

(f). Service - The value of seed to small farmers is also influenced by the "service" given such as; (a) the seed dealer's availability in cases of buyer dissatisfaction, (b) the associated services before and

after the sale, (c) the association with persons the farmer knows and can trust, (d) the technical competence of the SENASE, and sometimes (e) the free replacement of seed when SENASE or the dealer is at fault.

2.5.4. Dealer Development

Most of the PIPA seed will be sold through dealers. The SENASE must undertake special programs to develop and assist these retail dealers. Basic to the establishment of an effective system of dealerships is selection of the individual dealers. Identifying dealers who also sell other supplies used by the target farmers is a common and the most desirable approach. Effectiveness in the local community and fiscal responsibility are the primary requisites to be sought in these dealers.

In Paraguay, the local level "acopiadors" should be the primary source of dealers for PIPA seeds since they are most acutely aware of the needs and buying habits of the small farmers in their area and are dependent upon these farmers for their livelihood. Farmer cooperatives involved in local sales and purchases of items used and sold by the small farmers should also be contacted as potential dealers. Credicoop and BNF offices are less likely to be effective dealers because most small farmers have a minimual appreciation of the technical expertise available at public lending agencies. Traditional farmers are most likely to purchase seed from the same person who sells them other goods and services.

Initially, only one dealership should be established in each of the towns in the target zones which has a SEAG agency. This will require the establishment of 24 dealerships prior to the initial seed distribution early in 1981. Subsequent dealerships should be established in the same towns and at the same rate as the establishment of SEAG agencies. The specific and anticipated locations of the dealerships in each zone are shown on the seven Spatial Distribution Cluster Maps taken from the project paper (Appendix III).

The specific responsibilities the SENASE marketing manager should assign to seed dealers are: (a) to sell seed actively; (b) to write orders for seed in advance of the planting season; (c) to receive the seed from the SENASE and keep it in good condition; (d) to arrange for the farmer to collect the seed at a designated location unless the dealer is selling from a mobile unit; (e) to complete the sale and collect for the seed when the farmer receives it; (f) to provide continuous service to the buying farmer throughout the growing season; (g) to maintain year around communications with the SENASE concerning local conditions, customs, complaints and complements about the seed, and services supplied; and (h) to pay for the seed according to the agreed policy.

To attract the kind of individuals desired to serve as dealers, the SENASE assumes the responsibility to (a) provide advertising and promotional materials, and prepare technical information about the varieties

and quality of seed for sale; (b) to conduct dealer training schools to provide all dealer personnel with the technical information about each variety and its use in combination with other production inputs, plus guides for effective selling; (c) to send technical personnel to assit dealers in the investigations of major complaints; (d) to inform dealers of other government programs which influence sales such as credit for farmers and farm suppliers, educational-promotional activities and research and developments; (e) to supply order books, price lists, and related operational materials and forms; (f) to develop, maintain, and assure a complete understanding of specific policies concerning credit, seed return privileges, pricing, and related matters; (g) to refer inquiries received by mail or personal contact at fairs and exhibitions for follow-up contact by the dealers in their sales areas; and (h) to avoid underpricing the dealers operating within policy guidelines.

Every dealer should be subjected to an internal evaluation of effectiveness by SENASE at least once each year. Those dealers who comply with SENASE policies, are effective in selling seed and servicing their constomers needs, and cooperate with the total program should be identified and recognized at the dealer training meetings. The SENASE or the PIPA cannot afford to continuously support any dealer who is a detriment to the project. Such dealers must be identified and dropped from the list of authorized dealers at the earliest possible date.

2.6. Distribution

Economically, distribution completes the process through which the physical and biological properties of seed produced are converted to economic value for SENASE. The distribution system is so important that it can directly affect the goals of the crop breeding program. Distribution as part of seed marketing includes marketing channels and logistics.

2.6.1 Marketing Channels

The system through which the seed passes from the seed producer to the farmer-user is the marketing channel. The marketing channel bridges the gap between the producer and consumer. The question is, "Who will perform these functions?", all of which have two things in common; (a) they cost money and (b) they are usually most efficient when performed by specialists.

Why should SENASE market seed through a chain of intermediaries rather than directly to the small farmer? Intermediaries should be used because they carry some of the financial burden of distribution, especially when many outlets are necessary as is the case in PIPA, and they expand the skill, experience, efficiency and farmer contacts needed for successful marketing.

The answer to the question, "Who should perform the services in the marketing channels?", is dependent upon the relative efficiency and effectiveness of those involved. To the extent that intermediaries operate more economically than the SENASE, because of their scale of

operations, knowledge of local needs, and customer contacts, both the project and the farmers benefit.

The widespread use of seed, necessary to make an impact upon a country's agricultural productivity, is most often achieved by using decentralized or multi-tiered distribution channels. Retail dealers are close to the farmer and are in the best position to determine his reactions to the seed and services offered. They can render pre- and post-sales services to the farmer and provide valuable information to the SENASE concerning local needs.

The characteristics of seed and its attributes such as total volume, perishability, bulk, unit value, and customer service requirements have an important bearing on the marketing channel used. As an example of bulk and unit value, one seed producer could produce one ton of poroto seed and sell all of it to his neighbors. A neighboring seed grower could produce one ton of onion seeds, but he would have to depend upon many others to distribute the seed because onion seed are required in much smaller quantities by most farmers, is priced higher, and requires fewer kilos to plant a hectare than poroto (bulk value). Thus, a more extended marketing channel is required to market the onion seed, although, the volume of seed is the same for both crops.

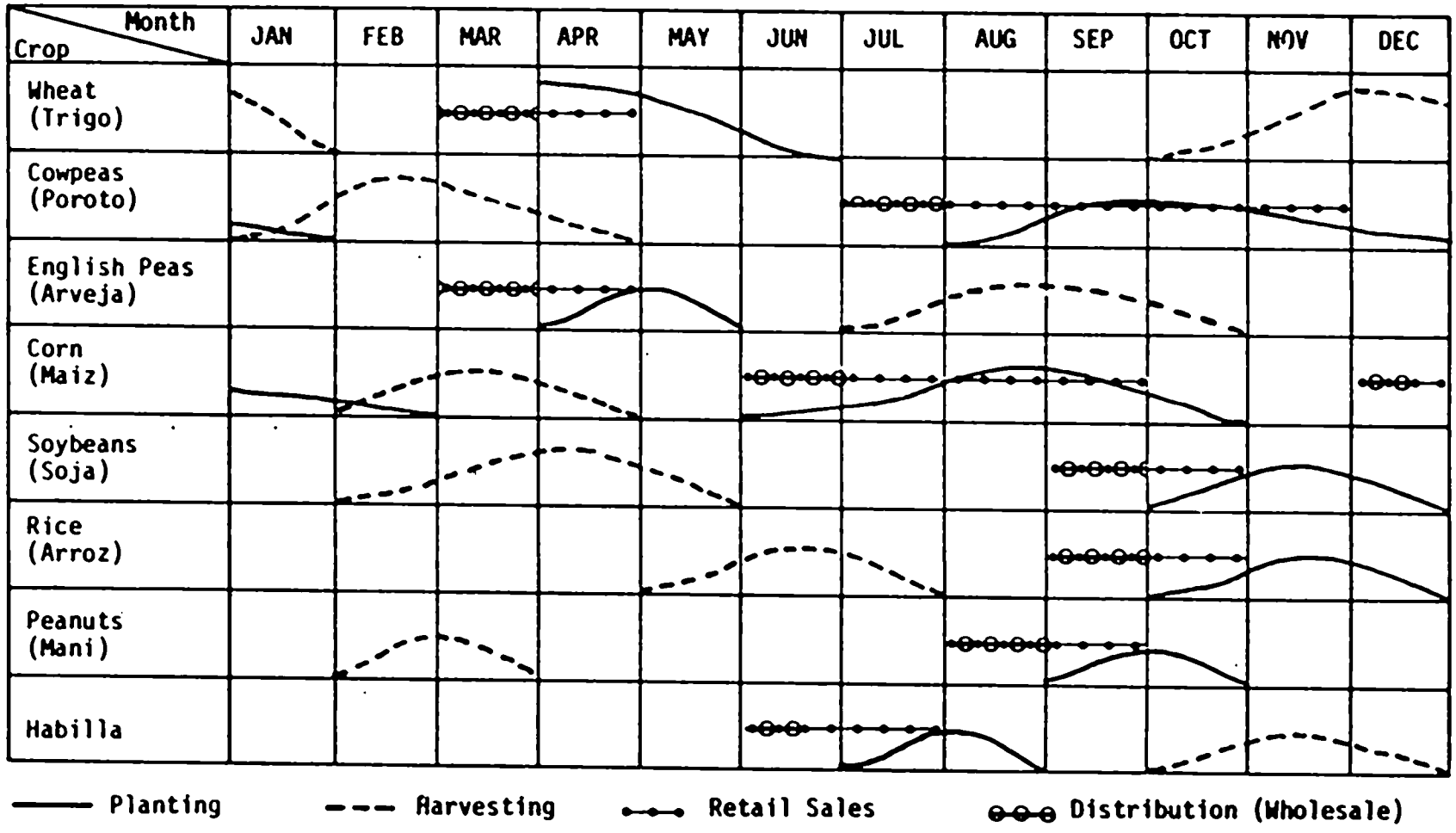
The maximum size package recommended for PIPA seed is five kilograms. Although this size package increases the direct cost of the seed it is the approximate amount of seed expected to be purchased by any one farmer. It also reduces the probability of seed substitution by unscrupulous dealers when compared with the usual 50kg package, is of a distinctive size making the bag readily identifiable with the PIPA, and is readily handled by either adults and children.

Selection and establishment of the proper marketing channel is crucial to the success of the total seed program and of each enterprise in it. The channel or channels chosen should complement the promotional and communication efforts of the SENASE and SEAG, act as a feedback mechanism for establishing market demand, and serve the needs of both the seller and buyer at the least possible cost to both.

2.6.2. Logistics

Logistics are those activities necessary to assure that needed quantities of seed of the desired varieties are moved from the place of production to the place of utilization so they are available when required. Logistics functions include the following activities: packaging, storage, inventory, transport and handling--primary and secondary facilities and this location, customer services, financing during storage and movement, information system supporting logistics, insurance against losses, invoicing, and collection. (See Table 5.)

a. Logistics costs - The logistical costs add little value to seed *per se*, but through them the seed's economic value will be returned to the SENASE. The cost of logistics of seed marketing are affected by



Source: SENASE

Table 5. Anticipated distribution schedule required to assure availability of PIPA seeds at the local level as associated with normal cropping pattern.

several factors relating to the production and consumption characteristics, infrastructure, and socio-economic conditions in Paraquay, including: (a) seasonality of production and use; (b) accumulation points of the seed; (c) spread of marketing area; (d) transportation and storage facilities, particularly in rural areas, for secondary transport and storage; (e) warm, often humid climate and the consequent deterioration in quality of both the seed and packaging materials; (f) inadequate handling skills and equipment and the consequent transit delays, damages, and losses; (g) the lack of cash and low availability of credit to many small farmers; and (h) underdevelopment of markets for crops produced.

Between 30 and 50% of the price to the farmer-consumer for most agricultural seeds are costs incurred after seeds are produced and processed. A major portion of these costs are assigned to logistical activities. Compared with more developed countries, the percentage of expenditures for logistical costs will be higher in Paraguay. A planned effort to reduce logistical costs will be required considering the need for seed, prices, and the farmer's ability to pay.

b. Improving logistical efficiency - The SENASE and SEAG administrators and the marketing manager concerned with providing seed to the small farmers are in a good position to improve logistical efficiency. This can be done in several ways, including inventory management, customer coordination, an internal information system, and reduce operating costs.

(1) Inventory Management - Producing more seed than can be marketed is likely to be a problem during the first two or three years. The costs of maintaining inventories are the highest of all logistical inputs because of the perishability of seed. A direct relationship exists between size of inventory and marketing expenses. Every demand for seed can be met, but at a cost. To maximize efficiency and, thus, reduce costs, the alternative is to decide upon lower than maximum inventory levels. However, as inventory levels are decreased to reduce costs, the number of farmers served may also be reduced. The administrators and the marketing manager will have to decide on a balance between people served and inventory costs. Market research can produce data useful in making this decision.

Because of the uncertainty in the real demand for seed it is likely that the initial production will exceed demand. As part of the inventory management program, the 4x5m "fumigation" room at the SENASE processing unit (San Ignacio) is being converted to a cool-dry storage room which will permit safe storage of 15-20MT of seed for up to 18 months. Conversion of this room is being financed pricipally with PIDAP funds, however, the PIPA has been asked to purchase 2-24,000 BTU air-conditioners as its contribution to SENASE's general facilities improvement program (see Section 4.0 of this report).

(2). Customer Coordination - Steps can be taken, in cooperation with the farmers and retailers to reduce logistical costs. Changes could include: (a) modifying the customers ordering patterns with more

advance bookings, (b) improving the handling system by shipping seed at the same time as other inputs, (c) transferring stock more carefully to avoid over-or under-stocking, and (d) altering ordering procedures.

When one organization controls all levels of the distribution system, the temptation is "to order" the changes listed above to take place. Ordering customers--independent dealers and farmers--to take a certain action is rarely effective and often damaging. Before instituting changes in an established pattern of distribution, contact as many customers as possible to obtain their reactions and ideas.

(3). Internal Information System - For the SENASE the customer's order is the single most important document affecting distribution. Where the order originated, what it contains, and when it should be filled sets the logistics system in motion. When the order is anticipated and filled promptly, the logistics system functions properly. Logistics fail when the order is not anticipated and no seed or an insufficient quantity of the variety ordered exists.

Design of an internal information system should stress the following principles: (a) obtain market information rapidly from customer orders, (b) start the flow of information when the order is taken, and (c) give priority to actions required to fill the order. Under the PIPA, every SEAG agency will have radio contact with SEAG headquarters (San Lorenzo), approximately 2kms from the SENASE headquarters. Through proper coordination and cooperation this communication system could be utilized to both relay special orders, transmit inventory data, etc. from authorized PIPA seed dealers to SENASE.

(4). Operating Costs - Transportation is a major expense item of marketing seed in a large geographic area. The magnitude of transport costs are directly affected by distance, quantity, means of transport, and the kind of seed involved. Adding production areas, processing centers, and/or storage warehouses reduces distances, but it increases facilities and labor costs. Farmers and dealers differ greatly in accessibility. Seed can be delivered to some by truck, to other by animal power, and to some only by portage. Transportation costs vary greatly and can cause the price to be prohibitive to some farmers when the real cost must be recovered through the retail selling price.

The anticipated distribution system for PIPA seeds is to utilize the SENASE facility at San Ignacio as the central distribution point. Because of the relatively small quantities involved and the roads servicing most of the prospective dealers it appears most economical to use trucks to transport seed from San Ignacio to the SEAG Regional Centers. The SENASE will need to rent a storage room (approx. 3x4m) from the SEAG or another appropriate place to be used for temporary seed storage. From the regional centers seed will be delivered to the authorized dealers by 4-wheel drive pick-up (to be purchased by PIPA funds). If the volume of seed sold greatly exceeds expectations, the dealers in many of the towns could be serviced directly from San Ignacio. The budget estimates include the costs of delivery to each regional center two

times/year and from the regional center to each dealer four times/year.

2.7 Pricing

The price that a farmer will pay for seed is determined by his perception of its benefit to him and his ability to pay. The price established by the seller includes all direct costs of production and marketing; profit, (if any), and an estimate of what the buyer will pay. Pricing is the administrator's most delicate way to influence a selling organization's effectiveness in attaining its goals.

Most farmers are suspicious of something provided free or at a very low cost when it is claimed to be better than what they have. Provision of free or heavily subsidized seed is not a longterm solution to building a good seed program. Some of the most successful seed supply programs have developed where seed was sold at a price high enough to cover all costs of production and marketing plus a profit for the seed enterprise and seed seller. Hybrid seed in Kenya was four times the grain price for many years without meeting the demand. Both public sector and private sector seed enterprises in India have priced hybrid and nonhybrid seed,since the early 1960's,at a rate sufficient to insure a profit.

The price of seed should not be arbitarily established because of other factors in addition to direct and indirect costs and profits. Most important are: the total supply of seed available, the price farmers receive for their produce, the availability of production credit, the actual market demand for the seed of the varieties to be sold, and competition, when the competitors operate under the same economic premise.

Those administrators responsible for the PIPA were and are aware that the seed marketing sub-project will be initially a "social welfare" program designed to assist the increasing numbers of the small farmers into the commercial economy of Paraguay. On the other hand, Paraguay's national seed policy is directed toward development of the production and commercialization of seed of the major crops in the private sector. As an equatible comprimize,only seed of the basic food crops will be distributed through the PIPA. These facts coupled with the fact that only small volumes of seed of traditional varieties will be sold means that this sub-project will be an economically deficit operation.

To minimize the deficit and to establish and maintain a realistic attitude concerning the seed input in the minds of the small farmers, the retail price of PIPA seed should be significantly above that of grain of the same crop. The actual retail price will be established for seeds of each crop each year by the SEAG/SENASE technical committee. Depending upon grain market fluctuations, the retail price of PIPA seed should probably not exceed two times the farm-gate the price of corn grain and one and one-half times the farm-gate grain market price of cowpeas and English peas. Higher prices for the varieties involved will greatly discourage farmer purchase of good seed while significantly lower prices will encourage farmers to purchase the seed for human consumption. By establishing the maximum retail price for PIPA seed the

Project can have at least monitoring control over the dealers retail price. Authorized dealers who charge higher prices can easily be identified and eliminated from the program.

To provide economic incentive for the local seed dealers, a margin of between 30 and 40% above the delivered price of seed is planned. This is the standard margin for acopadores in rural areas of the target zones. This margin should be sufficient to gain active participation of the local dealers cooperating with both the SENASE and SEAG programs. It is hoped that dealers will operate on a 30% margin above the delivered seed price since their normal 40% margin often covers transportation expenses.

This margin level is justified due to the risk involved, the SENASE plans to require cash payment for seed, and the additional record keeping at the dealer level which is incumbent with the program. It is assumed that those dealers who currently extend short term credit to their customers will continue this practice, as necessary. This could greatly expand the total credit available to the PIPA participants.

As can be determined by examining the estimated budgets (Appendix II) for the seed sub-project, a 40% dealer margin was used. The estimated maximum retail seed price is that at which the dealer would sell to the small farmers at his store. The SENASE would sell the seed to the dealers at 60% of the retail price. Obviously, if the dealers will effectively sell PIPA seeds at a 30% margin the anticipated loss to be covered from the revolving fund would be significantly less.

2.7.1. Components of Price

The actual price of each bag of seed is based primarily upon four components of price: direct costs, indirect costs, returns above total cost, and market factors.

a. Direct Costs - The components included in the direct costs of producing and marketing the PIPA seed are indicated in the budget estimates. Note that the percentage of the total cost associated with each technical phase differs, sometimes significantly. Principal direct costs in pricing non-hybrid cereal seeds are:

(1). Production: seed stocks, normal crop production, roguing, quality control, grower premium.
(2). Processing: drying, cleaning and grading, bags, tags, treatment, and storage.
(3). Marketing: market analysis, accumulation of stocks, services and promotion, and distribution.

b. Indirect Costs - Indirect costs are expenses of operation incurred without direct regard to the class of seed or volume of sales. Indirect costs include expenses such as taxes, insurance, building maintenance and repair, and depreciation. Also included are regulated

expenses that arise from the operation of an enterprise and are controllable within limits by the management such as; salaries of permanent employees, advertising, heating and cooling, and lighting. All of the above expenses occur regardless of whether the SENASE sells 10 or 1000 tons of seed. In general, private sector enterprises, including farmers, operate with lower indirect costs than comparable public sector operations. Many government enterprises do not include indirect costs when pricing seed because these expenses are budgeted from government revenues or, as in the case of taxes, they are exempt. To more closely approximate the actual costs of the seed and the program, these factors are included in the budget estimates. The SENASE is encouraged to maintain a separate accounting system which will permit a detailed analysis of all cost of this project.

c. Returns Above Total Costs - Returns above the total costs or margins are an essential part of the price of goods and services marketed by private sector enterprises, including farmers and dealers. Individuals and organizations which have accumulated sufficient monies to invest in any enterprise often have several alternative opportunities for their investments. To attract the monies necessary to cover the direct and indirect costs, as well as for the land, buildings, and facilities necessary before operations begin, the businessman must believe that the return from the money invested will be equal to or greater than from other alternatives. Thus, for example, the minimum return above total costs to the seed dealers should be above that interest paid on money placed in a savings account at a local bank. Generally, seed dealers anticipate an even greater return than that given in the example above because they assume a greater risk of losing money.

Regardless of whether the seed enterprise is operating in the private or public sector, when a return on investment capital is anticipated the price level must reflect the relationships between all costs and the user benefits. Thus, seeds of a new or distinctly superior variety may be priced at a level significantly higher than an older traditional variety because of the increase in value as perceived by the consumer, although, the direct and indirect costs per unit of seed for both varieties may be nearly equal. This method of establishing the price level when new varieties become available will permit SENASE/PIPA to offer a wider range of seeds and services than, for example, when price ceilings are based soley upon the price of grain.

d. Marketing Factors - Marketing factors may be defined as the interaction between the seed dealer (supply) and the farmer (demand). The major components placed into this interaction by the seed dealer are the amount of money available to the consumer, the quantity of the kind and variety of the seed marketed in relation to the damand, and the per unit marketing costs (direct and indirect costs plus margin). The major components placed into this interaction by the farmer-consumer are the perceived average price of the seed plus or minus a differential influenced by the kind of seed, location of the market, quality of the seed, amount of supplementary services and the competitive factors (alternatives such as saving his own seed).

Price competition for seeds of the "basic" crops in Paraguay is much keener than for seeds of hybrid varieties, forage species, vegetables, and flowers. Indeed, one characteristic of a basic crop is that its seed, or regenerative part, can be maintained from harvest to the next planting season. Thus, the major price competitor for the PIPA is the farmer who saves his own 'seed' and assigns it a value only slightly above that price received for grain. Thus, seed prices of many of the basic crops are left to the vagrancies of the local grain market which do not include some of the direct costs, nor most of the indirect and return on investment costs.

Seed which cannot be readily saved by the farmer because of environmental conditions, because they are consumed before maturity, i.e., many forages, fruits and vegetables, or loss of productivity attributable to genetic breakdown, i.e., hybrid varieties, essentially eliminate farmer competition and the wide price fluctuations common to seasonal markets for farm produce. The Kenya seed company example refered to throughout this paper has this particular advantage. The comparative stability in the price of seeds with which the farmers can not compete effectively is a major factor in influencing private sector participation in the development of a comprehensive seed program.

2.8 Administrative Overview

A most important factor influencing the overall success of the PIPA seed marketing sub-project will be the administration of the funds allocated for the sub-project. The SENASE already has a serious cash flow problem which will be aggravated by any arbitrary delays in the transfer of funds from SEAG. On the otherhand, the SEAG has every right to demand a proper accounting for all PIPA funds released to the SENASE.

For the good of the PIPA, but of greater importance for the development of Paraguay's total seed industry, the SENASE should keep accurate and detailed records of not only expenditures but also amount of seeds produced, processed, sold, carried-over, etc. This data and information will be of inestimatable value to those organizations which are interested in entering the seed business in Paraguay. If this is done the MAG will not only be providing a service to Paraguay's small farmers but to all Paraguay an agricultural input suppliers, current and future.

The budget estimates are sufficient for a modest but first class seed marketing program but these estimates can not replace effective management of the program. For example, the SENASE must have money on hand to pay for the seed produced on the day the seed are delivered from the contract growers. They should not have to wait even one day. On the otherhand, the 20% premium paid to the seed growers appears twice that which should be necessary when the grower is paid at the time his seed are delivered. Just this one change would reduce direct costs by 11%.

The SEAG can properly require a detailed accounting for every trip made, supplies purchased, and bag of seed sold or unsold to assure that

the funds for which it is responsible are in fact being spent for the PIPA and not SENASE's general program. If, for example, the SENASE Marketing Manager is going to Missiones to inspect a field of wheat for certification but on the way stops at Ybycui to visit the authorized PIPA seed dealer; who is responsible for travel and per diem, SENASE or SEAG/PIPA? What proof should SENASE provide the SEAG as proof that the seed purchased with PIPA funds is in fact sold to the target farmers and not to a grain dealer or a commercial farmer? Decisions on such matters should be made before, not after, they occur and will probably require re-writing of the original SEAG/SENASE convenio.

Space is provided in the budget estimates (Appendix II) to assign the cost of the various line items to either the PIPA (SEAG) or SENASE. It is hoped that those responsible will very carefully examine the bases for the budget estimates, particularly for Years 1 and 2 which provide details of the cost factors, before assigning responsibility for payment of the various items. The cooperative attitude which currently exists between the SENASE and SEAG is excellent. The tasks ahead for both organizations are difficult and uncertain, however, the opportunities for service to the small farmers the staffs of both organizations, the MAG and Paraguay are probably unparallel.

APPENDIX I

Time Phased Implementation Plan (Seed Multiplication and Marketing)

	Year 1 (1980)												Year 2 (1981)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I. Project Administration																								
1. SEAG/SENASE Convenio			X																					
2. SEAG Establish Account Systems			X																					
3. SEAG Order (Pick-Up, etc) from USA			X																					
4. Fiscal Allocation to SENASE				X											X									
5. Audit of SENASE Account													X											
6. Evaluation & Planning (Seed Sub-Project)													X											
II. SENASE/SEAG Administrative																								
1. Selecting Personnel																								
Mkt. Manager		X																						
Accountant			X																					
Secretary			X																					
2. Establish Dealer Policies				X	X																			
3. Set Up Inventory & Account Payable				X																				
4. Order Supplies																								
Packing Materials						X												X						
Promotion Materials							X												X					
Advertising Materials												X												X
5. Establish Wholesale/Retail Prices																								
Arveja													X											
Maiz																X								
Poroto																X								
6. Evaluation & Planning			X	X								X												
III. Market Demand (SEAG)																								
1. Survey of Farmers (3 zones)			a 1/			m&p			X	X	X													
2. Demand Estimate for 1981			X			X									a			m&p						
3. Demand Estimate for 1982															X			X						
IV. Accumulation (Production)																								
1. Selection of Stock Seed			X			X	X								a X			m X	p X					
2. Assign Production Contract																								
Arveia				X													X							
Maiz							X													X				
Poroto								X													X			
3. Receipt and Processing																								
Arveia									X															
Maiz													X											
Poroto													Y											

Time Phased Implementation Plan (Seed Multiplication and Marketing) - Continued

	Year 1 (1980)												Year 2 (1981)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
V. Communication																								
1. Preparation Informational Material						X	X											X						
2. Preparation and Order adver. material							X	X												X				
3. Ident. & Selection of Dealers									X	X	X										X	X	X	
4. Dealer & Training Schools												X						m&p						X
5. Implement of Mass Promotional Effort															a X			X						
6. Orders From Each Dealer																								
Arveja														X										
Maiz																X								
Poroto																X								
7. Field Days, Fairs, etc. (as scheduled)																								
VI. Distribution																								
1. To Regional Centers																								
Arveja															X									
Maiz															X									
Poroto																								
2. To Dealers																								
Arveja															X									
Maiz																		X	X					
Poroto																		X	X					
3. Stock Transfer - Dealer Re-Supply																								
Arveja																		X						
Maiz																								X
Poroto																								X
4. Inventory Verification & Seed Return																								
Arveja																		X						
Maiz																								X
Poroto																								X

1/ the letters a, m, and p indicate Arveja, Maiz and Poroto, respectively.

APPENDIX II

Budget Estimates for SENASE/PIPA Seed Marketing Sub-Project

(Year 1)

I. Indirect Costs of Marketing PIPA Seeds

Item	Annual Cost ₲	Paid By: PIPA	SENASE
1. Personnel 1/	846,000		
2. Perdiem 2/	99,000		
3. Vehicle Operations & Maintenance 3/	154,965		
4. Offices, Storage & Service 4/	114,000		
5. Marketing Materials & Supplies 5/	168,000		
6. Training, Promotion & Advertising 6/	1,428,000		
7. Contingency 7/	197,396		
Totals ₲	3,006,361		

* Does not include equipment purchase price (see Appendix II, pg 38).

Bases for Estimates

1/ Personnel:

GOP/MinAg/SENASE Budget

Marketing Manager	0.75 PY at ₲696,000/Yr. =	₲ 522,000
Accountant	0.25 PY at 696,000/Yr. =	₲ 174,000
Secretary	0.50 PY at 300,000/Yr. =	₲ 150,000
	Total	₲ 846,000

2/ Perdiem:

Zone

Paraguari	- 6 visits to each of 9 dealers at 5 days per trip	30 days
Encarnacion	- 6 visits to each of 7 dealers at 3 days per trip	18 days
Cordillera	- 6 visits to each of 8 dealers at 3 days per trip	18 days
	TOTAL	66 days

66 days at ₲ 1500/day TOTAL ₲ 99,000

3/ Vehicle Operation & Maintenance

(a) Operation

Paraguari	
San Lorenzo - Ybycui 218 km. x 6 visits =	1308
Ybycui - Target area dealers 1104 km. x 6 =	6624
Encarnacion	
San Lorenzo - Coronel Bogado 614 x 6 =	3684
Coronel Bogado - Target area dealers 248 x 6 =	1488
Cordillera	
San Lorenzo - Caacupe 80 km. x 6 =	480
Caacupe - Target area delaers 254 km. x 6 =	1524
TOTAL	15,180 km.

15,108 km. at ₲ 4.3/KM	₲ 64,965
(b) Maintenance - G 3,500/mo.	42,000
(c) Repairs - ₲ 4,000/mo.	48,000
TOTAL	₲ 154,965

4/ Offices, Storage & Services

(a) "Rent" to SENASE for space, equipment, and services ₲ 5,000/mo.	₲ 60,000
(b) Rent to SEAG for 3x4m room for temporary storage of seed 3 x ₲ 1,500/mo.	54,000
TOTAL	₲ 114,000

5/ Marketing Materials & Supplies:

Based on average "materials" costs for a SEAG regional center in Year 5 of the project not including inflation or contingency (page 30 of PP). Used for office supplies, order forms, inventory forms, invoices, etc. ₲ 7,000/dealer x 24 ₲ 168,000

6/ Training, Promotion & Advertising:

Funds to be used for dealer training schools one day/year/zone, cost of promotional materials supplied to dealers (in addition to those suppled by SEAG), authorized "PIPA Seed Dealer" identification signs.

(a) Dealer Training Schools

Transportation at ₲ 300/dealer x 24 =	₲ 7,200
Meals at ₲ 500 ea. x 30	15,000
Supplies ₲ 675 ea. x 24	16,000
₲ 1600/dealer	₲ 38,400

(b) Promotional materials and educational leaflets (prepared jointly be SEAG & SENASE) to be included in each bag and made available in quantity to each dealer.

(1) Printed materials: ₱ 1,250/dealer x 24 ₱ 30,000

(2) Promotional & advertising materials (pencils, combs, plastic bags, note pads, etc. printed with PIPA symbol) 500/dealer at ₱ 30 ₱ 15,000/dealer ₱ 360,000

(c) Metal "Authorized PIPA Seed Dealer" signs ₱ 27,000 ea. x 24 dealers ₱ 648,000

Total ₱ 1,420,000

7/ Contingency:

10% of the total of line items 2-6 Total ₱ 196,396

II.A Direct Costs of Maiz Seed

ITEM	ANNUAL COST
1. Cost of maiz seed bought from producers 1/	₱ 156,780
2. Processing cost 2/	62,712
3. Cleaning loss cost 3/	13,326
4. Packing costs 4/	45,987
5. Distribution costs 5/	16,141
6. Stock seed costs 6/	3,946
7. Contingency 7/	29,889
TOTAL	₱ 328,781

Cost/Unit = ₱ 44/Kg

Bases for Estimates

1. Cost of Maiz Seed Bought From Seed Producers

8710 Kg of maiz at ₱ 18.00/Kg ₱ 156,780

Based on farm grain price at harvest (Semanario Informativo sobre Mercadeo, MAG, Direccion de Comercializacion y Economia Agropecuaria, Departamento de Difusion y Asistencia Tecnica), plus 20% premium paid by SENASE.

2. Processing Cost

8710 Kg of maiz at ₲ 7.20/Kg ₲ 62,712

Based on SENASE's estimate. Includes storage and handling costs.

3. Cleaning Loss Costs

8710 Kg of maiz x 17% loss x ₲ 18.00/Kg: * ₲ 13,326

Based on SENASE's estimate.

* Half of loss recovered when sold for milling or grain purpose.

4. Packing Costs

(a)	Labor, 117 Man/hour at ₲ 60.00/man-hour	₲ 7,020
(b)	Bags, 1489 five Kg cloth bags at ₲ 20.00/bag	29,789
(c)	Tags, 1489 tags at ₲ 5.00/tag	7,445
(d)	Thread for portable sewing machine, 6 cones at ₲ 460.28/cone**	2,761
	Sub-total	₲ 47,006

Based on SENASE/s estimate.

** Based on Burrows catalog No. 20.

5. Distribution Costs

Two delivery freights, from San Ignacio to: ₲ 5,162

(a)	Ybycui, 127 Km x 2710 Kg x ₲ 0.015/Kg/Km	₲ 5,162
(b)	Coronel Bogado, 93 Km x 2155 Kg at ₲ 0.015/Kg/Km	3,006
(c)	Caacupe, 206 Km x 2580 Kg at ₲ 0.015/Kg/Km	7,972
	Sub-total	₲ 16,140

Based on SENASE's estimate.

6. Stock Seed

10 Kg of corn seed to plant 1 Ha. x ₲37.44x2 = ₲74.88/kg of seed planted

assume: 1 Ha. yields 1400 Kg, then 10kg x ₲74.88 = ₲748.8 ÷ 1400 Kg = ₲ 0.53/Kg stock seed cost for ea kg of soluble seed produced 7445kg x ₲0.53= 3,945

7. Contingency

10% of items 1-6 ₲ 29,889

II.B Direct Costs of Poroto Seed

Item		Annual Cost ₱
1.	Cost of seed bought from farmers 1/	261,450
2.	Processing costs 2/	21,961
3.	Cleaning loss 3/	22,223
4.	Packing costs 4/	19,100
5.	Distribution costs 5/	6,464
6.	Stock Seed	25,330
7.	Contingency	35,653
	Total	392,183
	Cost/Unit = ₱ 131/Kg.	

Bases for Estimates

1. Cost of Poroto Seed Bought from Producers

   3486 Kg. of Poroto at ₱ 75.00/Kg. — ₱ 261,450

   Based on farm grain price at harvest (from Semanario Informativo sobre Mercadeo, MAG, Direccion de Comercializacion y Economia Agropecuaria, Departamento de Difusion y Asistencia Tecnica), plus 20% premium paid by SENASE.

2. Processing Costs

   3486 Kg. at ₱ 6.30/Kg. — ₱ 21,961

   Based on SENASE's estimate. Includes storage and handling costs.

3. Cleaning Loss Cost

   3486 Kg. x 17% loss x ₱ 75.00 ÷ 2* — G 22,223

   Based on SENASE's estimate.

   * Half of loss recovered when sold for milling or grain purpose.

4. Packing Costs

(a)	Labor, 47 man/hr. at ₲60.00/man/hr.	₲ 2,820
(b)	Bags, 596 five Kg cloth bags at ₲20.00/bag	11,920
(c)	Tags, 596 tags at ₲500/bag	2,980
(d)	Thread for portable sewing machine 3 cones at ₲460.23/cone**	1,380
	Total	₲ 19,100

Based on SENASE's estimate

** Based on Burrogs catalog No. 80

5. Distribution Costs

Two delivery freight, from San ignacio to:

(a)	Ybycui, 127 Km x 1085 Kg at ₲0.015/Kg/Km	₲ 2,066
(b)	Coronel Bogado, 93 Km x 860 Kg at ₲0.015/Kg/Km	1,199
(c)	Caacupe, 206 Km x 1035 Kg at ₲0.015/Kg/Km	3,198
	Total	₲ 6,464

Based on SENASE's Estimate

6. Stock Seed

25 Kg of poroto seed to plant 1 Ha. x ₲102 x 2 = ₲204/kg of seed planted.

assume: 1 Ha. yields 600 Kg. then 25kg x ₲ 204 = ₲ 5710 ÷ 600 Kg = ₲ 8.50/Kg stock seed cost for ea. kg of soluble seed produced.
2980 kg x ₲ 8.5 = 25,330

II.C Direct Costs of Arveja Seed

	Item	Annual Cost
1.	Cost of seed bought from producers 1/	90,825
2.	Processing costs 2/	7,629
3.	Cleaning Loss 3/	15,440
4.	Packing cost 4/	6,595
5.	Distribution cost 5/	3,198
6.	Stock Seed	10,040
7.	Contingency 6/	13,373
	Total ₲	147,100

Cost/Unit = ₲ 142 Kg

Bases for Estimates

1. Cost of Arveja Seed Bought from Producers

1211 Kg of arveja at ₱ 75.00/Kg — ₱ 90,825

Based on farm gram price at harvest (from Semenario Informativo sobre Mercadeo, MAG, Direccion de Comercializacion y Economia Agropeduaria, Departamento de Difusion y Assistencia Tecnica) plus 20% premium paid by SENASE.

2. Processing Costs

1211 Kg at ₱ 6.30/Kg — ₱ 7,629

Based on SENASE estimate. Includes storage and handling costs.

3. Cleaning Loss

1211 Kg x 17% loss x ₱ 75.00 — ₱ 15,440

Based on SENASE estimate.

4. Packing Costs

(a)	Labor, 16 man/hrs at ₱ 60.00/man-hour	960
(b)	Bags, 207 five Kg cloth bags at ₱ 20.00/bag	4,140
(c)	Tags, 207 tags at ₱ 5.00/tag	1,035
(d)	Thread for portable sewing machine 1 cone at ₱ 460.28/cone**	460
	Sub-total ₱	6,595

Based on SENASE's estimate.

** Based on Burrogs catalog No. 20.

5. Distribution Costs

Two delivery freights from San Ignacio to:

- Caacupe, 206 Km x 1035 Kg at ₱ 0.015/Kg/Km — ₱ 3,198

Based on SENASE's estimate.

6. Stock Seed

25 Kg (arveja seed to plant 1 Ha.) x ₱116.41 x 2 = ₱232.82/kg of seed planted
assume 1 Ha. yields 600 Kg, then 25 kg x ₱ 232.8 = ₱9.7/kg
cost for each kg of seed produced. 1035 kg x ₱ 9.7 = 10,039

SENASE/PIPA (YEAR 1)

Estimated Balance Sheet

1980

Liabilities			
Indirect Costs (1 Mar.-31 Dec., 1980)			₱ 2,254,770 1/
Direct Costs			868,066
Maiz		₱ 328,781	
Poroto		392,184	
Arveja		147,101	
		Total	₱ 3,874,427
Assets			
Sales			
Inventory			₱ 595,070
Maiz	7,445 Kg at ₱ 26	₱ 193,570	
Poroto	2,980 Kg at ₱ 100	298,000	
Arveja	1,035 Kg at ₱ 100	103,500	
		Total	₱ 595,070
Total Assets less Liabilities			₱-3,279,357

Estimated operational deficit:	($ 28,700)	₱ 3,874,427
Estimated cost of equipment:	($ 11,700)	1,579,500

1/ Does not include cost or value of equipment required for marketing operations, i.e. pickup, balances, and two air conditioners (shown below).

EQUIPMENT FOR SENASE/PIPA PROGRAM

Item		Description	
1.	Pickup - 1/2 ton	4-wheel drive, diesel motor (same as those ordered by (SEAG)	$ 9,800
2.	Platform scales	1-100 kg. capacity, table top (local purchase)	300
3.	Air Conditioners (2)	Heavy duty 220 Hz 3ph 24,000 BTU (for cold-dry room at San Ignacio) $800 ea	1,600
			US $11,700

(Year 2)

Budget Estimate SENASE/PIPA

Estimated Free Market Demand for Fiscalized Seed of Target Crops in 1981.

PIPA Zone	Target Crops		
	Maiz 1/	Poroto 2/	Arveja 2/
Paraguari	2710	1085	4/
Encarnacion	2155	860	4/
Cordillera	2580	1035	1035
Crop Total (Kgs.)	7445	2980	1035

1/ Estimates based upon prior experience of traditional farmer voluntary acceptance of high quality seeds of traditional varieties. Should the project require participating farmers to purchase seeds of known quality there will be a direct relationship between % participation and % farmers purchasing seed. If distinctly superior varieties become available and are accepted farmer acceptance rates will be much higher for a period of only two to three years after the variety is released.

2/ Assumption: 5% of the target area farmers will purchase one-5kg. bag of seed.

3/ Assumption: 2% of the target area farmers will purchase one-5kg. bag of seed.

4/ Less than 100 kgs.

I. Indirect Costs of Marketing

	Item	Annual Cost ₲	Paid By: PIPA	SENASE
1.	Personel	1,146,000		
2.	Per diem	102,000		
3.	Vehicle Operation & Maintance	172,370		
4.	Offices, Storage & Services	150,000		
5.	Marketing Materials & Supplies	238,000		
6.	Training, Promotion & Advertising	876,900		
7.	Contingency (10%)	153,927		
8.	Inflation (20%)	567,838		
	Total ₲	3,407,035		

Bases for Estimates Budget

			P.Y.
1.	GOP/Min Ag.	Marketing Mgr.	1.0
		Accountant	0.5
		Secretary	0.5

2. Per diem

Paraguari - 4 visits to each of 9 vendors @ 5 days per trip	20 days
Encarnacion - 4 visits to each of 7 vendors @ 3 days per trip	12 days
Cordillera - 4 visits to each of 8 vendors @ 3 days per trip	12 days
Central - 6 visits to each of 5 vendors @ 2 days per trip	12 days
Neembercu - 6 visits to each of 5 vendors @ 2 days per trip	12 days
68 days @ ₲ 1,500 = ₲102,400 Total	68 days

3. Vehicle

a. Operations

Paraguari

San Lorenzo - Ybycui 218 x 4	872
Ybycui - Target area dealers 1104 x 4	4,416

Encarnacion

San Lorenzo - Corouel Bogado 614 x 4	2,456
Coronel Bogado - Target area dealers 248 x 6	992

Cordillera

San Lorenzo - Caacupe 80 x 4	320
Caacupe - Target area dealers 254 x 4	1,016

Central

San Lorenzo - Yaguaron 70 x 6	420
Yaguaron - Target area dealers 460 x 6	2,760

Neembucu

San Lorenzo - Pilar 740 x 6	4,440
Pilar - Target area dealers 244 x 6	1,464
Total	19,156 kms

19,156 kms @ ₲ 4.3 = ₲ 82,370
Maintence and repairs same as Year 1 = ₲ 90,000
Total vehicle operation & maintence ₲ 172,370

4.	Offices, furniture and services:		
	Same as Year 1 plus	₲	114,000
	Rent on 2 additional seed storage rooms	₲	36,000
		Total ₲	238,000
5.	Operational materials & supplies:		
	Same as Year 1 plus	₲	168,000
	10 additional dealers @ 7,000 ea		70,000
		Total ₲	238,000
6.	Training, promotion and advertising:		
	Same as Year 1 plus	₲	1,059,907
	a. two more dealer training schools @ 7,000		14,000
	b. promotional materials & leaflets for 10 additional dealers		162,500
	c. less 14 fewer authorized dealer signs		- 378,000
		Total ₲	876,900
7.	Contingency:		
	Calculated the same as Year 1	₲	153,927
8.	Inflation:		
	20% of the total of items 1-7	₲	567,838

II. a. Direct Costs of Maiz Seed

	Item	Annual Cost ₲
1.	Cost of Seed bought from producers 1/	282,442
2.	Processing cost 1/	112,977
3.	Cleaning loss 1/	21,183
4.	Packing cost 1/	84,140
5.	Distribution cost 1/	29,953
6.	Stock seed 1/	7,114
7.	Contingency 2/	53,780
8.	Inflation 3/	118,318
	Total ₲	709,907

Cost/Unit = ₲ 63./kg

Bases for Estimates

1.	Cost of maize seed bought from producers 13,076 Kg @ ₲ 21.6/Kg	₲	282,442

1/ Assumption actual demand will increase by 10% in Paraguari, Encarnacion and Cordillera. Two more areas (Centraland Neembucu) will use improved seed.

2.	Processing cost 13,076 kg @ ₲ 8.64/kg		₲ 112,977
3.	Cleaning loss 13,076 kg x 15% loss x ₲ 21.6/kg ÷ 2		21,183
4.	Packing cost 11,115 kg x ₲ 7.57/kg		84,140
5.	Distribution cost		
a.	Ybicui, 127 km x 2980 kg @ ₲0.015/kg/km =	₲ 5,676.90	
b.	Coronel Bogado 93kmx2370kg @ ₲0.015/kg/km=	₲ 3,306.15	
c.	Caacupe, 206kmx2840kg @ ₲0.015/kg/km =	₲ 8,775.60	
d.	Yaguaron, 178kmx1085kg @ ₲0.015/kg/km =	₲ 2,896.95	
e.	Pilar, 156kmx1840kg @ ₲0.015/kg/km =	₲ 4,305.60	
	Sub-total	₲ 24,961.20	
	24960 x 1.2		29,953
6.	Stock seed ₲45 x 10 x 2 = ₲900 ₲900 ÷ 1400 = ₲0.64 x 11,115 kg		7,114
7.	Contingency 3/ Calculated at 10% rate		53,780
8.	Inflation		118,318

II b Direct Costs of Poroto Seed

	Item	Annual Cost ₲	Paid By: PIPA	SENASE
1.	Cost of seed bought from producers 1/	471,690		
2.	Processing costs 1/	39,621		
3.	Cleaning loss 1/	35,377		
4.	Packing costs 1/	33,724		
5.	Distribution costs 1/	12,015		
6.	Stock seed 1/	48,114		
7.	Contingency 2/	64,054		
8.	Inflation 3/	128,108		
	Total ₲	832,703		

Price/Unit ₲187/kg

Bases for Estimates

1.	Cost of Poroto seed purchased from producers 5241 kg @ ₲90/kg		₲ 471,690
2.	Processing Costs 5241 kg @ 67.56/kg		39,621
3.	Cleaning loss 5241 kg x 15% loss x ₲90 ÷ 2		35,377
4.	Packing cost 4455 kg x ₲ 7.57/kg		33,724
5.	Distribution costs		
a.	Ybicui 127km x 1195kg @ ₲0.015/kg/km	= ₲ 2,276	
b.	Coronel Bogado 93km x 945kg@₲0.015/kg/km	= ₲ 1,318	
c.	Caacupe 206km x 1145kg @ ₲0.015/kg/km	= ₲ 3,538	
d.	Yaguaron 178km x 435kg @ ₲0.015/kg/km	= ₲ 1,161	
e.	Pilar 156km x 735kg @ ₲0.015/kg/km	= ₲ 1,720	
	Sub-total	₲10,013	
	₲ 10,013 x 1.2 =		12,015
6.	Stock Seed 130 x 2 x 25/kg = ₲6500 ₲6500 ÷ 600 = ₲10.8 x 4455		₲ 48,114
7.	Contingency		64,054
8.	Inflaction (based @ 20% annually)		128,108

II. c. Direct Costs of Arveja Seed

Item	Annual Cost ₲	Paid By: PIPA	SENASE
1. Cost of seed purchased from producers 1/	167,310		
2. Processing costs 1/	14,054		
3. Cleaning loss 1/	25,096		
4. Packing cost 1/	11,960		
5. Distribution costs 1/	5,639		
6. Stock seed 1/	18,170		
7. Contingency 2/	24,222		
8. Inflation 3/	53,290		
Totals ₲	319,741		

Cost/Unit = ₲202/kg

Bases for Estimates

1.	Cost of arveja seed purchased from producers 1859gg @ ₱90.00/kg	₱ 167,310
2.	Processing costs 1859/kg @ ₱7.56/kg	14,054
3.	Cleaning loss 1859 kg x 15% loss x ₱90./kg	25,096
4.	Packing costs 1580 kg x ₱6.31/kg x 1.2	11,960
5.	Distribution costs	
a.	Caacupe, 206km x 1145kg x ₱0.015/kg/km = ₱3,538	
b.	Yaguaron, 178km x 435kg x ₱0.015/kg/km = ₱1,161	
	Sub-total ₱4,699	
	4,699 x 1.2 =	5,639
6.	Stock seed ₱138 x 2 x 25 = ₱6900 ÷ 60 = ₱11.5 x 1580	18,170
7.	Contingency 2/ calculated @ 10%	24,222
8.	Inflation 20% Inflation rate/year	53,290

SENASE/PIPA (YEAR 2)
Estimated Balance Sheet
1981

Liabilities			
Indirect costs			฿ 3,407,035
Direct costs			1,862,351
Maiz	709,907		
Poroto	832,703		
Arveja	319,741		
(other crops)			
		TOTALS	฿ 5,269,386
Assets			
Sales (90% of stocks)			535,200
Maiz 6,700kg @G26	฿ 174,200		
Poroto 2,680 kg @ G100	268,000		
Arveja 930 kg @ ฿100	93,000		
Inventory			
Carry Over (90% of value)			53,585
Maiz 745 kg @ ฿ 23	17,135		
Poroto 300 kg @ ฿ 90	27,000		
Arveja 105 Kg @ ฿ 90	9,450		
New Crop (100% value & inflation)			1,068,765
Maiz 11,115 kg @ ฿ 31	344,565		
Poroto 4,45 kg @ ฿120	534,600		
Arveja 1,580 kg @ ฿120	189,600		
		TOTALS	฿ 1,657,550
Assets less Liabilities			฿-3,611,836

Estimated Operational Deficit: (US $ 35,329) ฿ 4,734,186

Crop	Indirect Cost/Kg	Direct Cost/Kg	Actual Cost/Kg	Est. Selling Price SENASE	Est. Selling Price Retail
Maiz	330	63	393	26	36
Poroto	330	187	517	100	140
Arveja	330	202	532	100	140

(Year 3)

Budget Estimates SENASE/PIPA

Estimated Free Market Demand for Fiscalized Seed of Target Crops in 1982

PIPA Zone	Target Crops		
	Maiz	Poroto	Arveja
Paraguari 1/	2,980	1,195	*
Encarnacion 1/	2,370	965	*
Cordillera 1/	2,840	1,145	1,145
Central 2/	1,085	435	435
Neembucu 2/	1,840	735	*
Crop Totals (kgs.)	11,115	4,455	1,580

1/ Assumption: actual demand will increase by 10% each year up to a maximum of 20% of the total seed requirement for Maize and Arveja and 5% for Poroto. * less than 100 kgs.

2/ Assumptions: same as Year 2.

I. Indirect Costs of Marketing

Item	Annual Cost	Paid By: PIPA	SENASE
1. Personnel	₲ 1,375,200		
2. Per deim	162,000		
3. Vehicle Operation & Maintence	231,036		
4. Offices, Storage & Services	223,200		
5. Marketing Materials & Supplies	384,240		
6. Training, Promotion & Advertising	1,151,288		
7. Contingency	352,912		
8. Inflation	775,407		
Total	₲ 7,657,433		

Bases for Estimates

Item No.

1. GOP/Min Ag. Budget same as year 2 + 20% — ₲ 1,375,200

2. Per diem

a. Paraguari, Encarnacion Cordillera Zones same as Year 2	44 days
b. Central and Numbuca Zones 4 visits each vendor @ 2 days per trip/zone	16 days
c. Caazapa Zone - 6 visits to each of five dealers @ 2 days/trip	12 days
d. Caaguazu Zone - 6 visits to each of 7 dealers @ 3 days/trip	18 days
	90 days
90 days @ ₲1500 = ₲135,000 x 1.2 =	₲ 162,000

3. Vehicle

a. Operation

1. Paraguari, Encarnacion & Cordillera Zones same as Year 2 — ₲ 10,072km

2. Central and Neermbuca Zones 4 trips each — 6,056km

3. Caazapa Zone
   - San Lorenzo - Caazapa 430 x 6 — 2,580km
   - Caazapa to Target area dealers 237 x 6 — 1,422km

4. Caaguazu Zone
   - San Lorenzo - San Jose 180 x 6 — 1,080km
   - San Jose to Target area dealers 439 x 6 — 2,634km
   - 23844km @ ₲4.3 = ₲102,530

b. Maintence & Repairs
   - same as Year 1 ₲90,000
   - Total A & B = 192,530 x 1.2 = ₲ 231,036

4. Offices, storage & services:
   - same as Year 2 = + ₲ 236,200
   - 2 temporary seed storage rooms 36,000
   - Total 186,000 x 1.2 = ₲ 223,200

5. Operational materials & supplies
   - same as Year 2 + 236,200
   - 12 new dealers @ 7,000 84,000
   - 320,200 x 1.2 = ₲ 384,240

6.	Training, promotion & advertising: same as year 2 +	858,407	
	a. two additional dealer training schools	14,000	
	b. promotional materials & leaflets for two additional dealers	33,000	
	c. two additional dealer signs	54,000	
		959,407 x 1.2 =	฿ 1,151,288
7.	Contingency: 10% of the total items 2-6		352,912
8.	Inflation 20% of items 1-7		775,407

II. a. Direct Costs of Maiz

Item	Annual Cost
1. Cost of seed purchased from seed producers	497,978
2. cost of processing	198,425
3. Cleaning loss	49,798
4. Packing Costs	143,264
5. Distribution costs	63,645
6. Stock seed	12,535
7. Contingency	96,564
8. Inflation	212,442
Total	฿ 1,274,651
Cost/Unit ฿78/kg	

Bases for Estimates

1. Cost of Maiz seed purchased from producers 19153 kg x ฿26/kg	฿	497,978
2. Cost of processing 19153 kg x ฿ 10.36/kg	฿	198,425
3. Cleaning loss 10153 kg x 15% x ฿26 + 2	฿	49,798
4. Packing cost 16,280 kg x ฿ 8.8	฿	143,264

5. Distribution costs

a. Ybicui, 127km x 3280kg x ₲0.015/kg/km	6,248	
b. Coronel Bogado, 93km x 2610kg x ₲0.015/kg/km	3,641	
c. Caacupe, 206km x 3125kg x ₲0.015/kg/km	9,656	
d. Yaguaron, 178km x 1195kg x ₲0.015/kg/km	3,191	
e. Pilar, 156km x 2025kg x ₲0.015/kg/km	4,738	
f. Caazapa, 360km x 1440kg x ₲0.015/kg/km	7,776	
g. San Jose, 229km x 2605kg x ₲0.015/kg/km	8,948	
Sub-totals	44,198	
44,198 x 1.44 =		₲ 63,645

6. Stock seed

₲ 54 x 2 x 10 = ₲ 1080
₲ 1080 ÷ 1400 = ₲ 0.77 x 16280 kg — ₲ 12,535

7. Contingency
Calculated @ 10% — ₲ 96,564

8. Inflation
Inflation rate 20% annually — ₲ 212,442

II. b. Direct Costs of Poroto

Item	Annual Costs ₲
1. Cost of seed produced from producers 1/	829,008
2. Cost of progrocessing 1/	69,084
3. Cleaning loss 1/	62,176
4. Packing costs 1/	59,247
5. Distribution costs 1/	25,531
6. Stock seed	84,825
7. Contingency 2/	112,987
8. Inflation 3/	248,576
Total ₲	1,491,434

Cost/Unit ₲ 228/kg

Bases for Estimates

1. Cost of Poroto seed purchased from seed producers
7676 kg @ ₲ 108/kg — ₲ 829,008

2. Cost of processing
7676 kg @ ₲9./kg — ₲ 69,084

3. Cleaning loss
   7676 kg x 15% x ₲108 ÷ 2 — ₲ 52,176

4. Packing costs
   6525 kg x ₲9.08/kg — ₲ 59,247

5. Distribution costs

a. Ybicui, 127km x 1315kg x ₲0.015/kg/km	2,505	
b. Coronel Bogado, 93km x 1040kg x ₲0.015/kg/km	1,451	
c. Caacupe, 206km x 1260kg x ₲0.015/kg/km	3,893	
d. Yaguaron, 178km x 480kg x ₲0.015/kg/km	1,282	
e. Pilar, 156km x 810kg x ₲0.015/kg/km	1,895	
f. Caazapa, 360km x 580kg x ₲0.015/kg/km	3,132	
g. San Jose, 229km x 1040kg x ₲0.015/kg/km	3,572	
Sub-total	17,730	
17,730 x 1.44 =		₲ 25,531

6. Stock seed
   ₲156 x 2 x 25 = ₲7800
   7800 ÷ 600 = ₲13.0 x 6525kg — ₲ 84,825

7. Contingency
   2/ calculated @ 10% — ₲ 112,987

8. Inflation
   3/ Assuming and inflation rate of 20% annually — ₲ 248,576

II. c. Direct Costs of Arveja

Item	Annual Cost ₲
1. Cost of seed purchased from producer 1/	353,160
2. Cost of processing 1/	29,430
3. Cleaning loss 1	52,920
4. Packing costs 1/	25,020
5. Distribution costs 1/	12,996
6. Stock seed	38,364
7. Contingency 2/	51,189
8. Inflation 3/	112,616
Total ₲	675,695

Cost/Unit ₲243/kg

Bases for Estimates

1.	Cost of Arveja seed purchased from producers 3270 kg x ₱ 108.00		₱ 353,160
2.	Cost of processing 3270 kg x ₱ 9.0/kg		₱ 29,430
3.	Cleaning loss 3270 kg x 15% x ₱108		₱ 52,920
4.	Packing costs 2780 kg x ₱ 9.00/kg		₱ 25,020
5.	Distribution costs		
	a. Caacupe, 206km x 1260kg x ₱0.015/kg/km	3,893	
	b. Yaguaron, 178km x 480kg x " " "	1,282	
	c. San Jose, 229km x 1040kg " " "	3,572	
	Sub-total	8,747	
	8747 x 1.44 =		₱ 12,996
6.	Stock seed ₱16600 x 2 x 25 = 8300 8300 ÷ 600 = 13.8/kg x 2780		₱ 38,364
7.	Contingency 2/ calculated at 10%		₱ 51,189
8.	Inflation 3/ Assuming a 20% inflation rate/year		₱ 112,616

SENASE/PIPA (Year 3)
Estimated Balance Sheet
1982

Liabilities			
Indirect Costs			₱ 4,657,433
Direct Costs			3,441,780
Maiz	₱ 1,274,651		
Poroto	₱ 1,491,434		
Arveja	₱ 675,695		
(other crops)			
		Total	₱ 8,000,213
Assets			
Sales (90% stock)			₱ 1,046,725
Maiz	10,675 at 31 = 330,925		
Poroto	4,280 at 120 = 513,600		
Arveja	1,685 at 120 = 202,200		
Inventory			
Carryover (90% value)			₱ 102,840
Maiz	1185 at 28 = 33,180		
Poroto	475 at 108 = 51,300		
Arveja	170 at 108 = 18,360		
New Crop			₱ 1,941,910
Maiz	16,280 at 37 = 601,990		
Poroto	6,525 at 144 = 939,600		
Arveja	2,780 at 144 = 400,320		
	Total Assets		₱ 3,091,475
	Total Assets less Total Liabilities		₱-5,007,738
Estimated Operational Deficit:	(US$ 52,630)		₱ 7,052,488

Crop	Indirect cost/kg	Direct cost/kg	Actual cost/kg	Est. Whole Sales Price SENASE	RETAIL
Maize	280	78	358	31	43
Poroto	280	228	508	120	168
Arveja	280	243	523	120	168

(Year 4)

Budget Estimates SENASE/PIPA

Estimated Free Market Demand for Fiscalized Seed of Target Crops in 1983.

PIPA Zone	Target Crops		
	Maiz	Poroto	Arveja
Paraguari 1/	3,280	1,315	*
Encarnacion 1/	2,610	1,040	*
Cordillera 1/	3,125	1,260	1,260
Central 1/	1,195	480	480
Neembucu 1/	2,025	810	*
Caazapa 2/	1,440	580	*
Caaguazu 2/	2,605	1,040	1,040
Crop Totals (kgs)	16,280	6,525	2,780

Assumptions: 1/ same as Year 3 assumption 1/

2/ same as Year 2 assumptions 1/, 2/, 3/ and 4/

Year 4

Estimated budgets for this year were computed in the same basic manner as previous years, therefore, only line item data are presented. The major reasons for changes in line item values are the 20% inflation factor and the increased volume of seed of each crop that should be sold. It is anticipated that additional seed kinds, peanuts and lima beans, and hopefully superior varieties of corn, cowpeas and English peas will be available for distribution.

I. Indirect Costs of Marketing

	Item	Annual Cost ₲	Paid By: PIPA	SENASE
1.	Personnel	₲ 1,650,240		
2.	Per diem	172,800		
3.	Vehicle operation & maintence	261,488		
4.	Offices storage & services	267,840		
5.	Marketing materials & supplies	461,088		
6.	Training, promotion & advertising	1,303,788		
7.	Contingency	246,700		
8.	Inflation	872,788		
	Total ₲	5,236,977		

II. a. Direct Costs of Maiz Seed

Item	Annual Cost ฿	PIPA	SENASE
1. Cost of seed purchase from producers	653,015		
2. Processing costs	261,206		
3. Cleaning loss	48,976		
4. Packing costs	222,022		
5. Transportation costs	84,000		
6. Stock seed	42,000		
7. Contingency	131,129		
8. Inflation	288,485		
Total	฿ 1,730,909		

Cost/Unit = ฿96/kg

II. b. Direct Costs of Poroto Seed

Item	Annual	PIPA	SENASE
1. Cost of seed purchased from producers	1,097,330		
2. Processing costs	76,560		
3. Cleaning loss	82,300		
4. Packing costs	65,149		
5. Distribution costs	33,715		
6. Stock seed	110,032		
7. Contingency	146,508		
8. Inflation	322,319		
Totals	฿ 1,933,913		

Cost/unit = ฿ 270/kg

II. c. Direct Costs of ARVEJA Seed

Item	Annual Cost ฿	Paid By: PIPA	SENASE
1. Cost of seed purchase from producers	468,000		
2. Processing costs	39,600		
3. Cleaning loss	70,200		
4. Packing costs	33,660		
5. Distribution costs	16,637		
6. Stock seed	50,796		
7. Contingency	67,889		
8. Inflation	149,356		
Totals	฿ 896,138		

SENASE/PIPA (YEAR 4)

Etimated Balance Sheet

1983

Liabilities					
1. Indirect Costs					฿ 5,236,977
2. Direct Costs					4,560,960
Maiz	1,730,090				
Poroto	1,933,913				
Arveja	896,138				
(Other Crops)				Total	฿ 9,797,937
Assets					
1. Sales					1,871,160
Maiz	15,720 at	฿ 37 =	581,640		
Poroto	6,300 at	144 =	907,200		
Arveja	2,655 at	144 =	382,320		
2. Inventory					
a. Carryover					฿ 186,935
Maiz	1,745 at	฿ 33 =	57,585		
Poroto	700 at	130 =	91,000		
Arveja	295 at	130 =	38,350		
b. New Crop					฿ 2,558,475
Maiz	17,905 at	฿ 44 =	787,820		
Poroto	7,175 at	173 =	1,241,275		
Arveja	3,060 at	173 =	529,380		
				Total	฿ 4,616,570
Total Assets less Total Liabilities					฿-5,181,367
Estimated Operation Deficit: (US$ 59,155)					฿ 7,926,777

Crop	Indirect Cost/Kg	Direct Cost/kg	Actual Cost/Kg.	Est. Selling Price Wholesale SENASE	Retail
Maiz	212	96	308	37	52
Poroto	212	270	482	144	202
Arveja	212	293	505	144	202

(Year 5)

Budget Estimates SENASE/PIPA

Estimated Free Market Demand for Fiscalized Seed of Target Crops in 1984.

PIPA Zone	Target Crops		
	Maiz	Poroto	Arveja
Paraguari	3,610	1,430	*
Encarnacion	2,870	1,145	*
Cordillera	3,435	1,385	1,385
Central	1,315	530	530
Neembucu	2,225	900	*
Caazapa	1,585	640	*
Caaguazu	2,865	1,145	1,145
Crop Totals	17,905	7,175	3,060

Assumptions: same as Year 3 assumption #1/

Year 5

Estimated budgets for this year were computed in the same basic manner as previous years, therefore, only line item data are presented. The major reasons for changes in line item values are the 20% inflation factor and the increased volume of seed of each crop that should be sold. It is anticipated that additional seed kinds, peanuts and lima beans, and hopefully superior varieties of corn, cowpeas and English peas will be available for distribution.

I. Indirect Costs of Marketing PIPA Seeds

	Item	Annual Cost ₲	Paid By: PIPA	SENASE
1.	Personnel	₲ 1,980,288		
2.	Per diem	207,360		
3.	Vehicle operation & maintence	313,785		
4.	Offices storage & services	321,408		
5.	Marketing materials & supplies	553,305		
6.	Training, promotion & advertising	1,564,545		
7.	Contingency	296,040		
8.	Inflation	1,047,346		
	Total	₲ 6,284,077		

II. a. Direct Costs of Maiz Seed

Item	Annual Cost ฿	PIPA	SENASE
1. Cost of seed purchase from producers	857,290		
2. Processing costs	347,550		
3. Cleaning loss	64,297		
4. Packing costs	293,061		
5. Distributing costs	110,683		
6. Stock seed	22,255		
7. Contingency	169,513		
8. Inflation	372,930		
Totals	฿ 2,237,579		

Cost/Unit = ฿ 114/kg

II. b. Direct Costs of Poroto Seed

Item	Annual	PIPA	SENASE
1. Cost of seed purchased from producers	1,448,460		
2. Processing costs	101,206		
3. Cleaning loss	108,634		
4. Packing costs	86,023		
5. Distribution costs	33,822		
6. Stock seed	145,213		
7. Contingency	192,335		
8. Inflation	423,139		
Totals	฿ 2,538,832		

Cost/unit = ฿ 322/kg

II. c. Direct Costs of ARVEJA Seed

Item	Annual Cost ฿	Paid By: PIPA	SENASE
1. Cost of seed purchase from producers	617,604		
2. Processing costs	51,467		
3. Cleaning loss	92,640		
4. Packing costs	43,745		
5. Distribution costs	21,917		
6. Stock seed	67,300		
7. Contingency	89,467		
8. Inflation	196,828		
Totals	฿ 1,180,968		

Cost/Unit = ฿ 351/kg

SENASE/PIPA (YEAR 5)

Etimated Balance Sheet

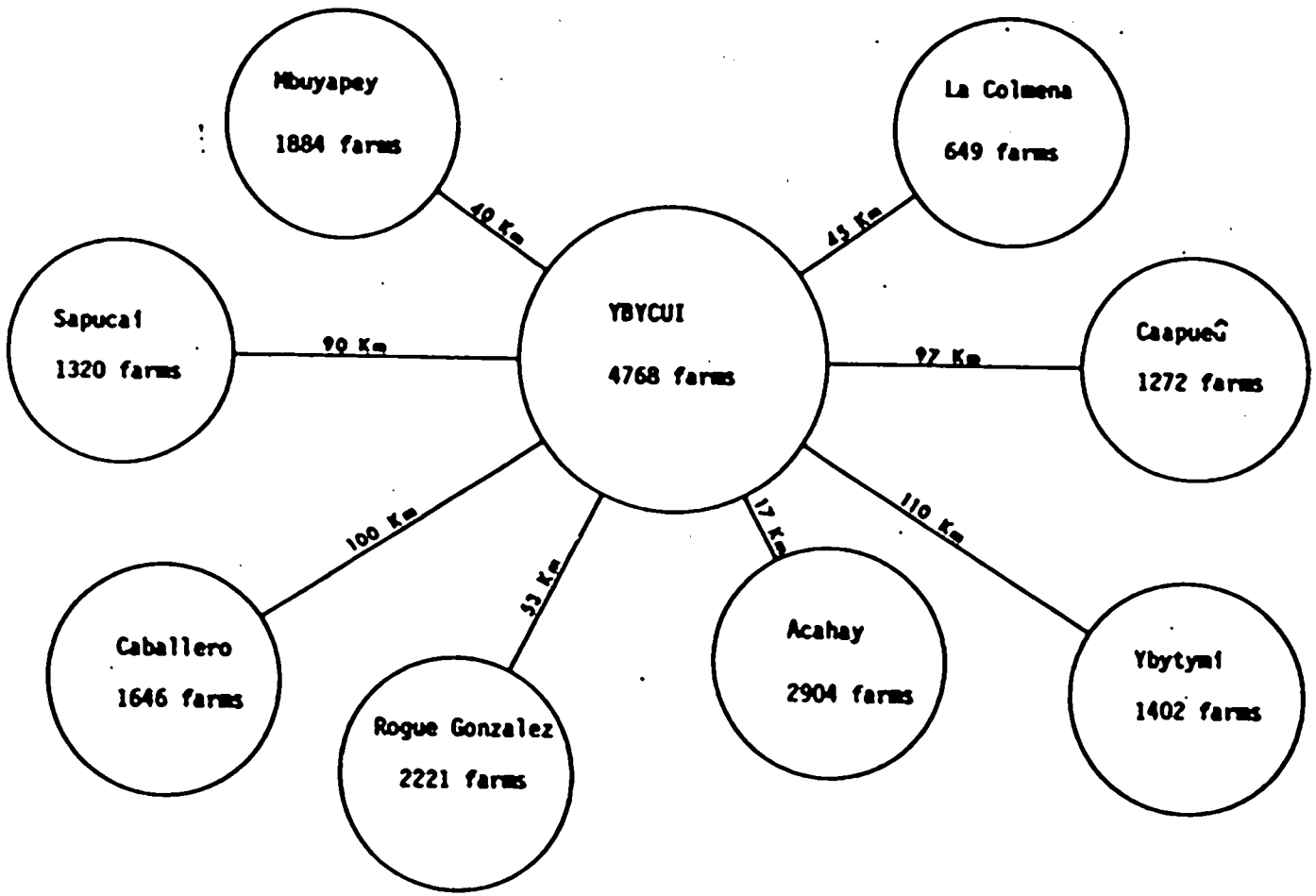
1984

Liabilities				
1. Indirect Costs				฿ 6,284,077
2. Direct Costs				5,957,379
Maiz	฿ 2,237,579			
Poroto	2,538,832			
Arveja	1,180,968			
(Other Crops)			Total	12,241,456
Assets				
1. Sales Recepts				2,527,170
Maiz	17,685 at ฿ 44		฿ 778,140	
Poroto	7,090 at 173		1,226,570	
Arveja	3,020 at		522,460	
(Other crops)				
2. Inventory				
a. Carryover				฿ 263,015
Maiz	2,065 at ฿ 40		฿ 82,600	
Poroto	785 at 156		122,460	
Arveja	335 at 155		57,955	
b. New Crop				฿ 3,077,845
Maiz	17,905 at ฿ 53		฿ 948,965	
Poroto	7,175 at 208		1,492,400	
Arveja	3,060 at 208		636,480	
(Other crops)			Total	฿ 5,868,030
Total Assets less Total Liabilities				฿-6,373,426
Estimated Operation Deficit: (US$ 72,494)				฿ 9,714,286

Crop	Indirect Cost/Kg	Direct Cost/kg	Actual Cost/Kg.	Est. Selling Price Wholesale SENASE	Retail
Maiz	218	114	332	44	62
Poroto	218	322	540	173	242
Arveja	218	351	569	173	242

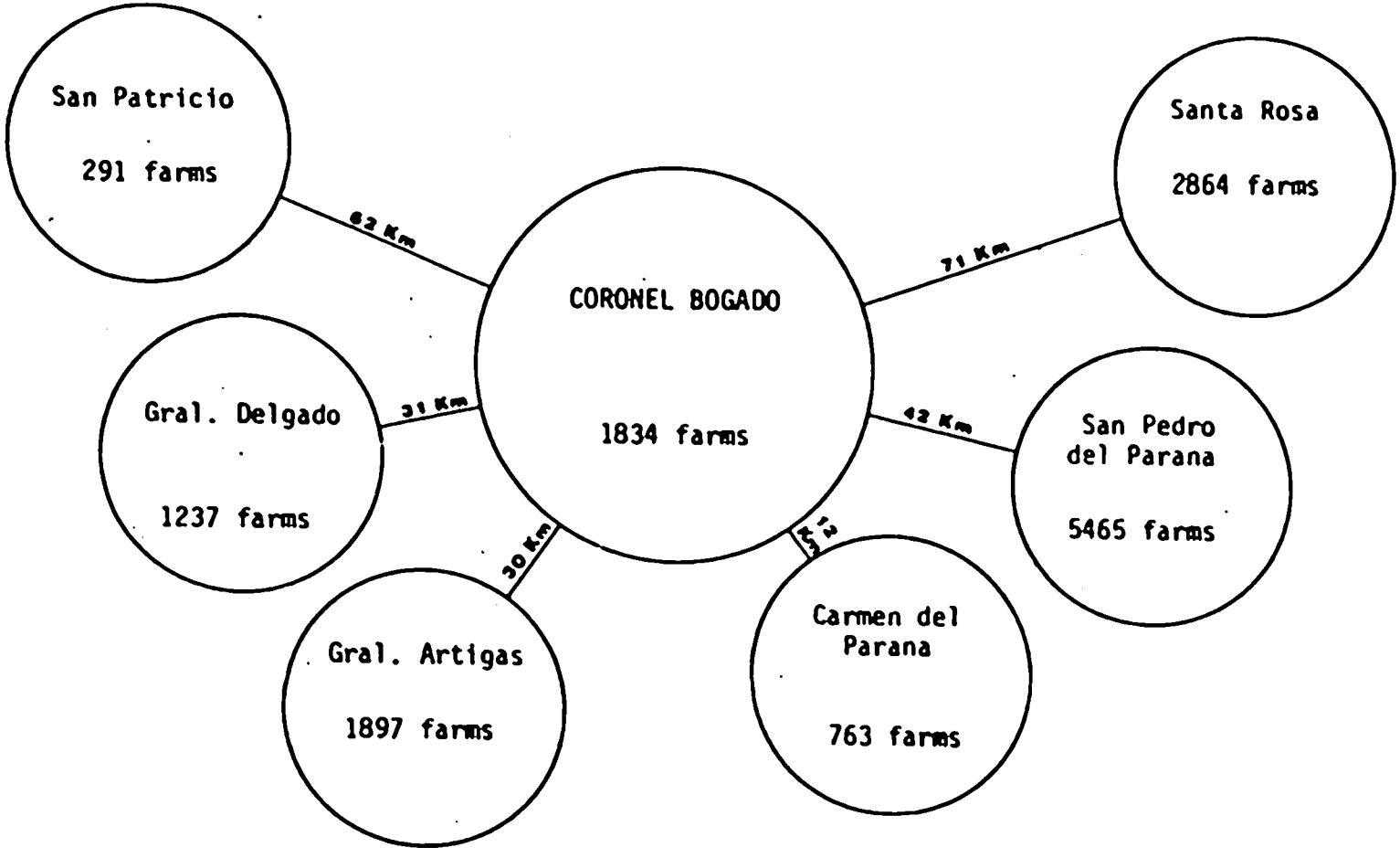
PARAGUARI ZONE

Location of SEAG Regional Center, PIPA seed dealerships, and number of small farms in target zone (Year 1)



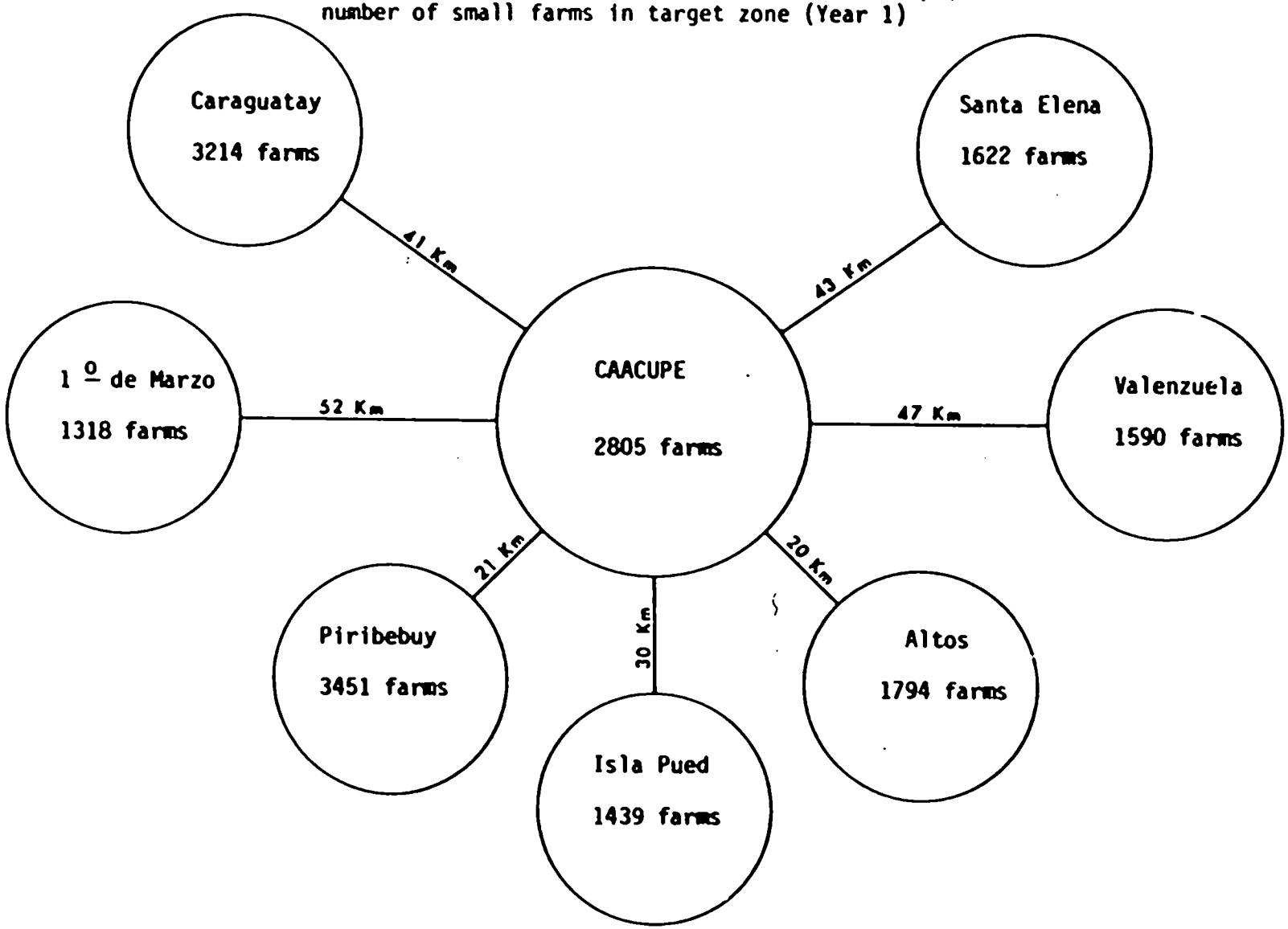
ENCARNACION ZONE

Locations of SEAG regional center, PIPA seed dealers and numbers of small farms in target zone (Year 1)



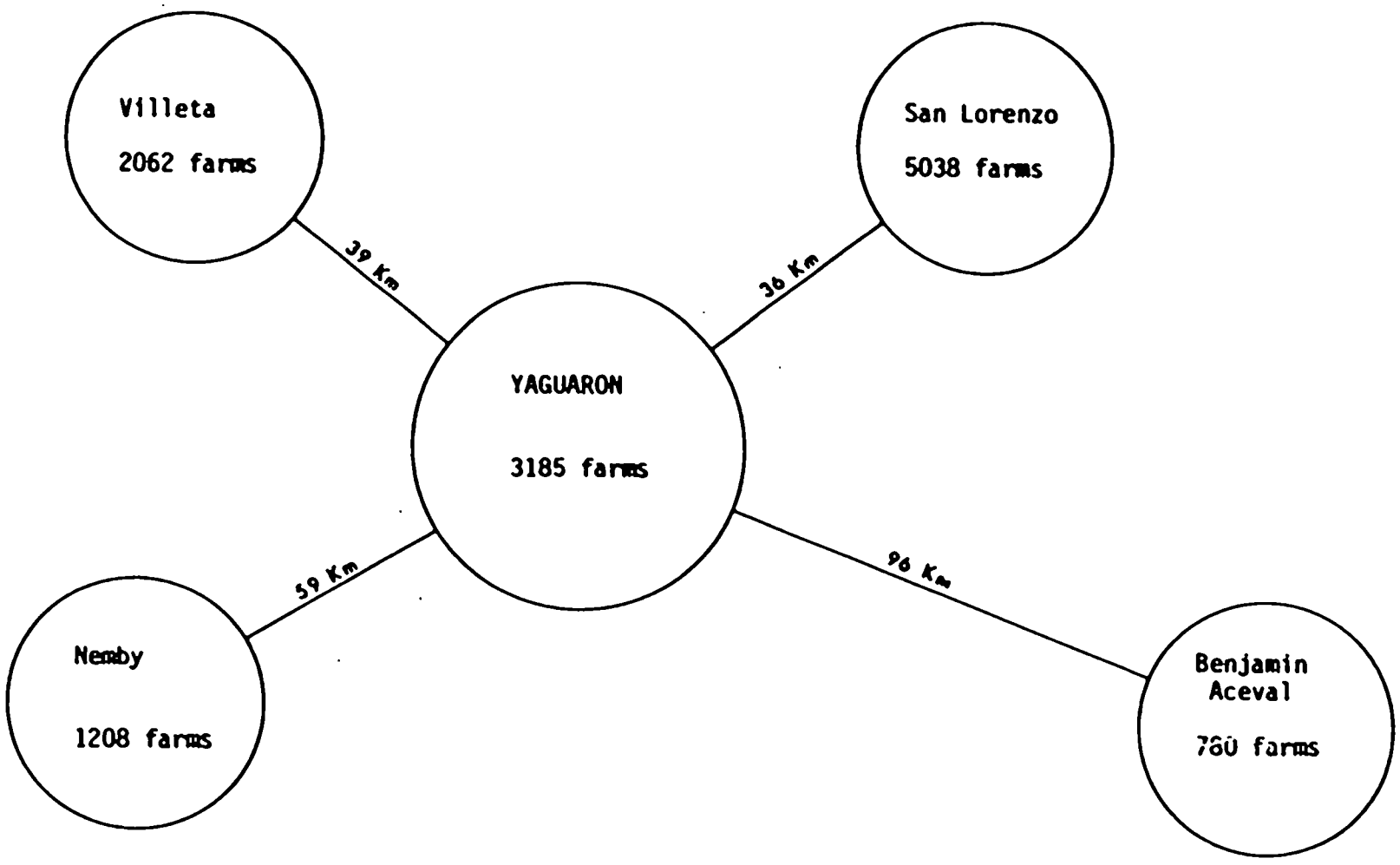
CORDILLERA ZONE

Location of SEAG Regional Center, PIPA seed dealerships, and number of small farms in target zone (Year 1)



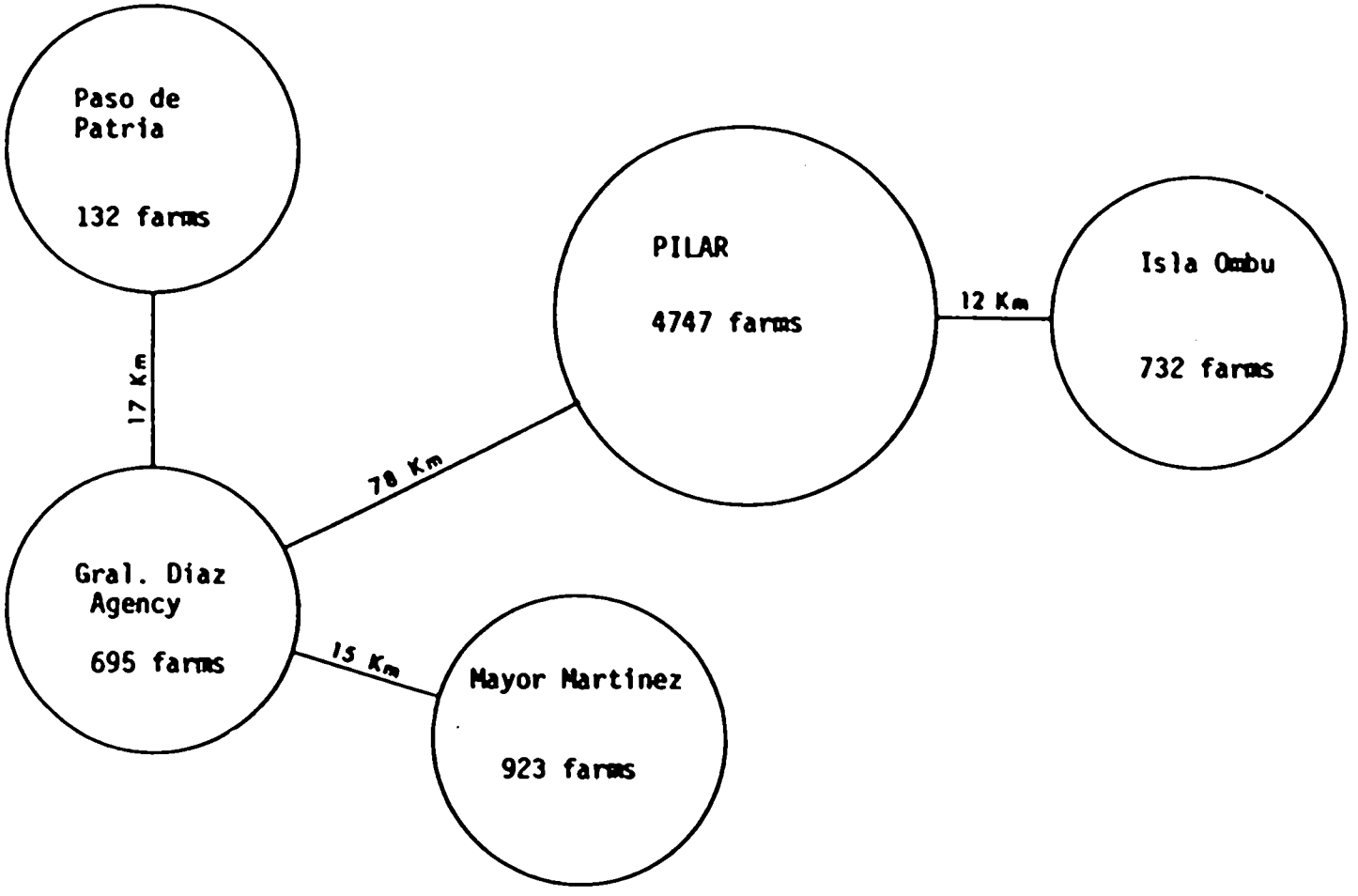
CENTRAL ZONE

Location of SEAG Regional Center, PIPA seed dealerships, and numbers of small farms in target zone (Year 2)



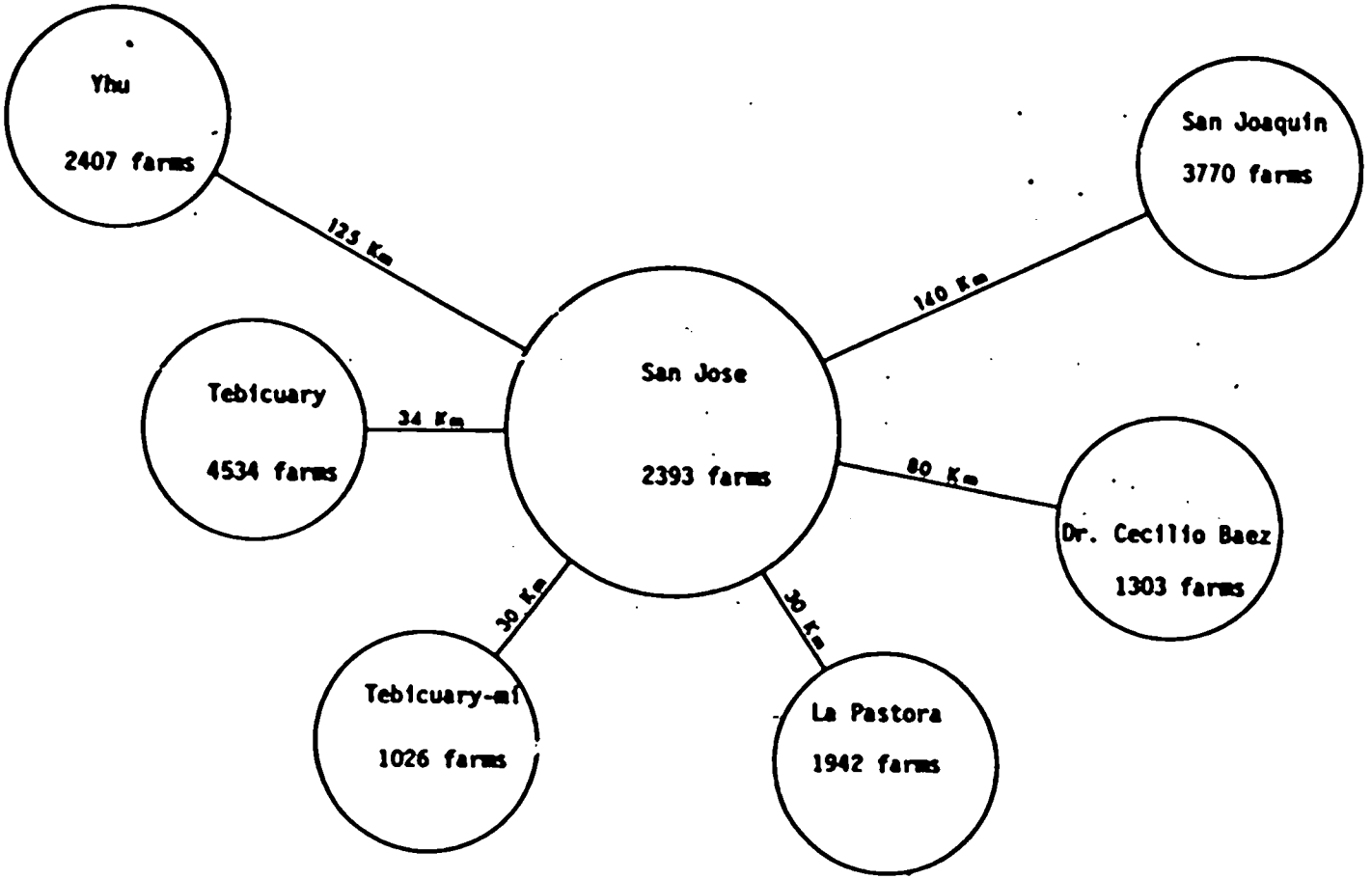
NEEMBUCU ZONE

Location of SEAG Regional Center, PIPA seed dealerships and numbers of small farms in target zone (Year 2)



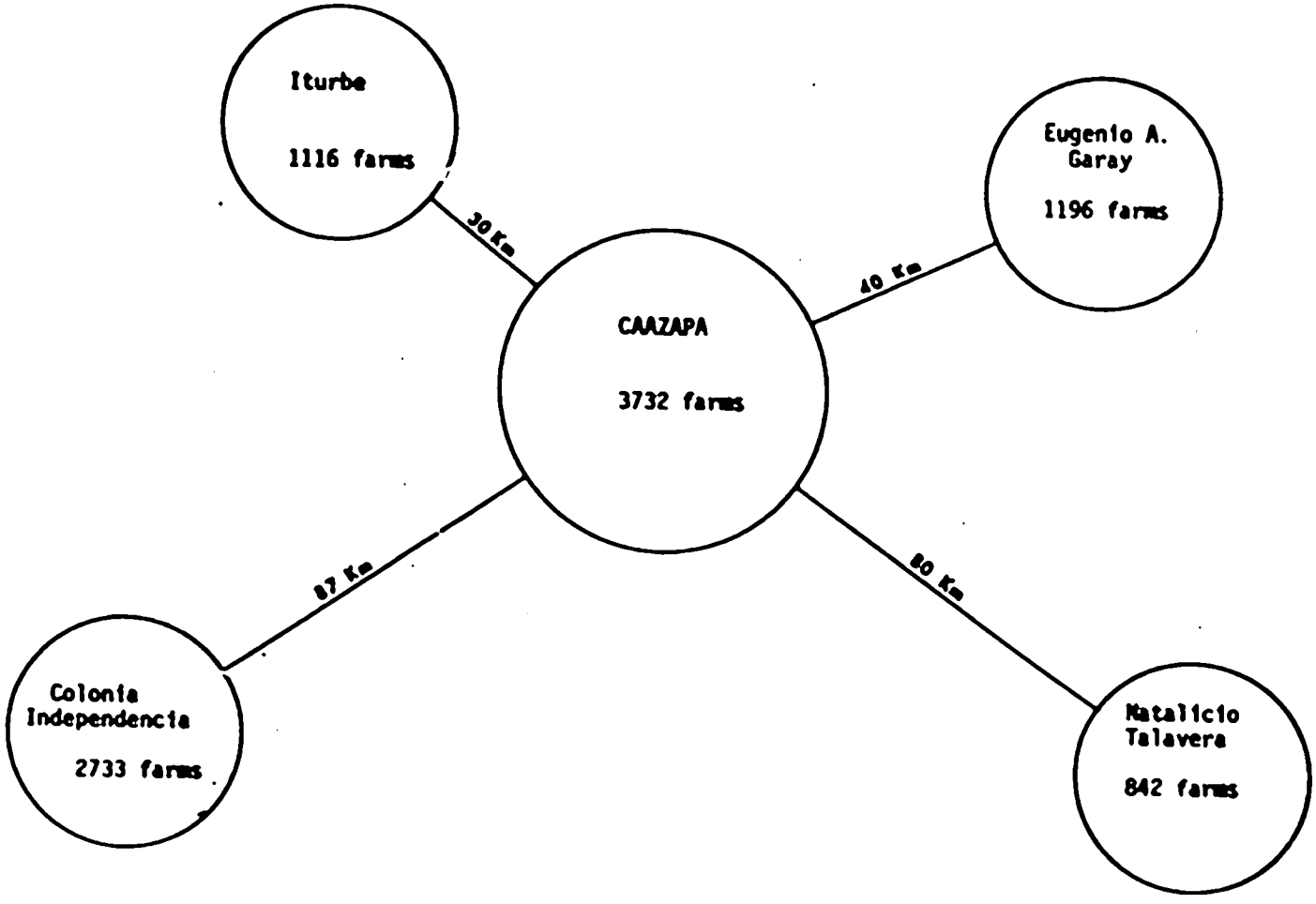
CAAGUAZU ZONE

Location of SEAG Regional Center, PIPA seed dealerships, and numbers of small farms in target zone (Year 3)



CAAZAPA ZONE

Location of SEAG Regional Center, PIPA seed dealerships, and numbers of small farms in target zone (Year 3)



3.0 NATIONAL SEED PROGRAM/INDUSTRY

3.1. Background

The SENASE is a branch of the Forestry and Agricultural Research and Extension Section (DIEAF) of the MAG. The SENASE is responsible for all the activities of seed production, certification, sales and regulation carried out by the MAG.

Because of the need for a more advanced type of agriculture for the development of the country, the Government of Paraguay (GOP) in 1971 implemented an Integrated Project for Agricultural Development (PIDAP), in which limited funds were allocated for the implementation of a seed sub-project.

In 1972, USAID/Paraguay requested and obtained the services available under contract AID/CSD-2976, for assistance in planning, initiation and implementation of the seed sub-project 1/. As part of this technical assistance, preliminary engineering drawings for SENASE's seed drying, processing, storage and testing facilities were developed, the location of the proposed facility was established and a list of the equipment needed was suggested. In 1974, the buildings for the Seed Testing Laboratory and SENASE's Headquarters at San Lorenzo were finished. Seed drying, cleaning and storage facilities located at San Ignacio were equipped and completed in 1978.

3.2. Organization

Since its reorganization in 1971, few changes have taken place in the SENASE's organizational structure (Table 5). In 1978, a Secretariat Section was added to assist SENASE's administration, the Production Section was reorganized into the Processing Section and the Seed Testing Laboratory Section was created.

The Control and Technical Assistance Section, besides being responsible for the implementation of the seed regulatory and seed certification programs, provides technical assistance to the private seed growers in the areas of production, harvesting and drying seeds.

At the present the SENASE's technical staff is formed by the Director, Chief of Production and Technical Assistance, Chief of Processing, Head of the Seed Testing Laboratory and seven technicians (Ingenieros Agronomos and Agronomos). By limiting the number of personnel, the MAG's involvement in the commercial aspects of the seed program is limited primarily to regulation, training and promotion.

1/ Potts, H.C., J.C. Delouche, G.M. Dougherty and G.B. Welch. 1972. Report to USAID/Paraguay on the seed sub-project of the PIDAP and related work. Report TA 72-9, pp 88, 13 drawings. Seed Tech. Lab., Miss. State Univ., Miss. State, MS, 39762.

SERVICIO NACIONAL DE SEMILLAS

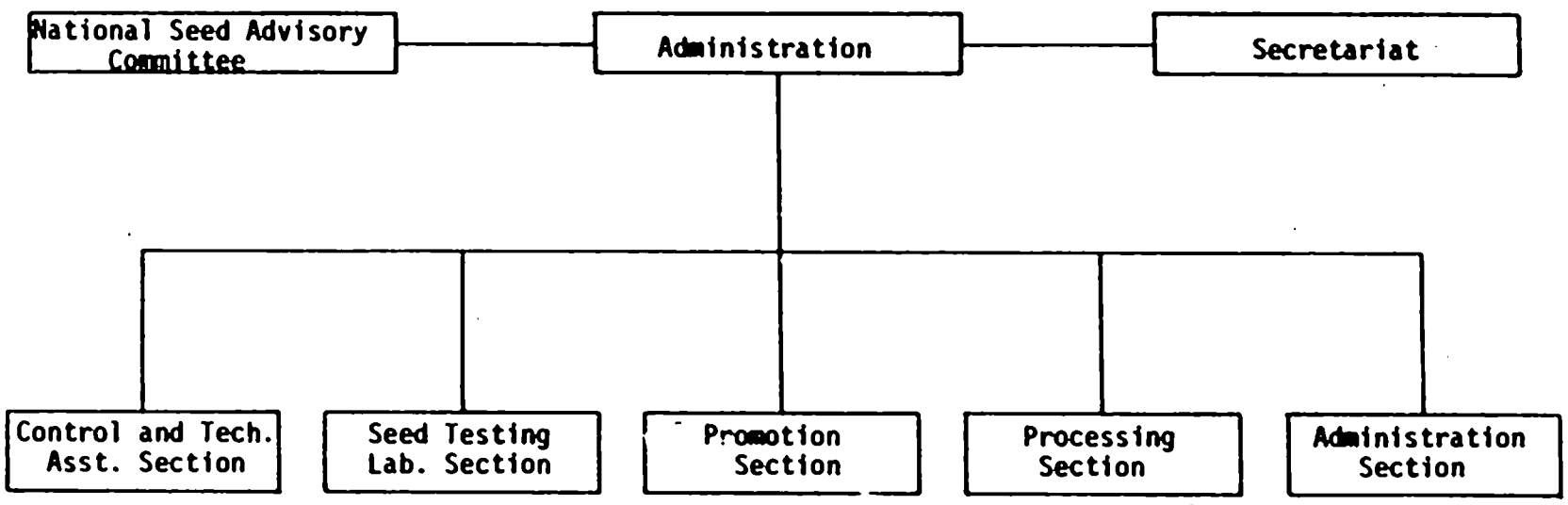


Table 5 . Table of Organization - National Seed Service (SENASE)

3.3. Technical Operations

3.3.1. Sources of Seed Stock

The Instituto Agropecuario Nacional (IAN) and the Centro Regional de Investigacion Agricola (CRIA) are the two research institutions in Paraguay that work toward the development of improved varieties and testing of introductions of superior varieties of the commonly cultivated crops. They function as sources of Foundation Seed and are responsible for maintaining seed stocks of all recommended varieties. Seed of all varieties have to be produced each year to maintain the varieties due to a lack of suitable storage facilities.

The Japanese government has allocated $22 million to improve the infrastructure and to increase personnel in CRIA. These new facilities will reportedly include facilities for maintence of seed stocks.

3.3.2. Seed Production

The SENASE has continued its practice of contracting the production of some seed to assure at least a limited supply of seeds of known quality are available each year, principally cotton, wheat and soybeans. This practice is justified because no commercial sources of seed (private sector) are available to date. All cotton seed is produced by the Officina Fiscalizadora de Algodon & Tobaco (OFAT) but is inspected in the field and after cleaning by SENASE inspectors with analyses run by the Laboratory. The numbers of seed producers (certified and fiscalized classes) are given in Table 6.

Table 6. Number of seed producers by crop from 1972 to 1977.

Species	1972	1973	1974	1975	1976	1977
Wheat	10	7	28	19	9	8
Soybeans	17	11	22	14	9	10
Cotton	--	750	747	1,099	1,130	1,239
Rice	--	--	--	1	1	1
Totals	27	768	797	1,133	1,149	1,258

Source: SENASE 1977

The Cooperativa Colonias Unidas Agricola Ltda. in Obligado has initiated a seed division and holds promise of being the first commercial field seed operation in Paraguay. This cooperative is producing seed of both wheat and soybeans for its members but plans on expanding its production to levels which will permit sales to non-members. They are working closely with SENASE personnel with all its seed "fiscalized" by the SENASE.

Individual seed producers have the option of producing and marketing certified or fisicalized seed themselves, under the constraints indicated in the referenced report 1/. Those seed growers who produce seed under contract to SENASE recognize that, although, they meet all contract requirements, payment for the seed may be delayed for several months because the SENASE must re-establish its line of credit with the Banco Nacional de Formento (BNF) every year.

The restricted availability of credit has resulted in the need for the SENASE to pay a premium of 20% over the grain prices, rather than the more usual 10%, to encourage seed producers to sell the seed produced as seed rather than as grain for which they are paid on delivery.

3.3.3. Drying, Processing and Storage

SENASE's modern drying, processing and storage facilities are located at San Ignacio, Departament of Misiones. This location was established after an evaluation of the costs of transporting seed from the various production areas, present and future markets, highway network and seed production potential areas. These facilities were designed by MSU/Seed Technology Laboratory, and slighly re-designed and constructed by a Cuban grain-cleaning design and construction company.

The drying unit consists of eight, 3x4m, batch drying bins. The paired arrangement permits four centrifugal fans to supply air, one fan for each two bins. It was designed this way to lower equipment costs, but it has the disadvantage that requires closer supervision than a single fan/unit system. The receiving area has a vibrating dump-pit, which will be of great advantage when more seed is handled in bulk. At the present time, seed coming from the field in bags is dumped into the dump-pit, transfered with an elevator to a drag-flight conveyor which takes it to any of the batch drying bins. Once dried, the seed are discharged to a vibrating conveyor by a short screw conveyor, and move to the processing plant or back to another batch drying bin for bulk storage. The loaded capacity of each bin for drying purposes is 12.5 metric tons, and 25 M.T. for temporary storage. These bins can also be used to dry bagged seed by simply placing a layer of bags on the false floor.

The processing plant is well equipped to handle all major kinds of free flowing seed. Two separate processing lines permit the processing of two different classes of seed or different lots, simultaneously. One line includes an air-screen cleaner, two width-thickness graders, a gravity table, seed treater, and bagging scale. The other line has an

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1/ op. cit.

air-screen cleaner, a cylinder separator, seed treater and bagging scale. An enclosed type spiral separator will be purchased under the seed sub-project of the PIDAP II. This will allow for a more efficient processing of soybean and wheat seed.

The SENASE processed 1724 MT of wheat of different seed classes during the 1979 processing season. A larger volume of seed could have been processed but due to adverse weather conditions and the credit problem (Sec. 3.3.2) no soybean seed were purchased or processed.

Seed processed and bagged is stored in the 3000 M^2 flat-warehouse storage adjacent to the processing plant. The capacity of this warehouse is 6000 M.T. when pallets are used and all aisles are open, but if seed is stacked in aisles or if 50% of the seed is hand stacked, the capacity of the warehouse is doubled.

The drying, cleaning and storage capacity of this facility is sufficient for the forseeable future. The efficiency of operation of this facility could be markedly improved if an experienced seed processing specialist worked with the processing personnel for as little as one week during the processing season.

3.3.4. Seed Quality Control

SENASE's seed testing laboratory is located adjacent to the headquarters in San Lorenzo. It is equiped with two double-chamber, daylight or dark seed germinators, moisture testers, Boerner dividers, a weight per hectoliter tester, purity work boards and working tables. A walk-in germinator is under construction.

The seed analysts conduct moisture, purity and germination tests on different species and varieties of those seeds purchased and sold by SENASE. In addition, a small but increasing number of service samples are tested each year, primarily for germination. The 1,623 tests conducted during 1979 was three times the number conducted in 1971. The Seed Testing Lab., has the capability to analyze many more samples than are currently being tested. Table 7 shows the number of samples and kind of test conducted in 1978/1979. In addition to the routine work of the lab., an FAO sponsored seed testing short course was conducted by Laboratory and foreign technical assistance personnel last year.

3.3.5. Marketing

SENASE is not aggressively involved in seed marketing. It is the normal procedure that any farmer that wants to purchase seed from SENASE picks up the seed at San Ignacio. As a service, those farmers who want to have the seed delivered to their farms, the SENASE will contract a truck and add the freight to the seed cost. This permits the availability of delivery service but prevents SENASE from becoming involved in delivery services, which would increase the costs of operation. This system is in keeping with the MAG's national seed policy of maintaining the SENASE

Table 7. Number of seed samples of different crops analyzed in the Seed Testing Laboratory at San Lorenzo. 1978/79.

Test	No. of Samples				
Crop	Germination Test	Purity Test	Moisture Test	Hectoliter Determination	Totals
Wheat	729	129	129	129	1,008
English Peas	4				4
Soybeans	334		170		504
Vegetable Seeds	50				50
Pasture Seeds	34	10			44
Peanuts	7				7
Cotton	3				3
Corn	3				3
Totals					1,623

Source: SENASE, 1979.

as a service and regulatory agency, thus promoting development of the private sector.

As in the past, the National Seed Advisory Committee is responsible for establishing the price of seed. For the major field crops the seed price is always above the base price for commercial grain of the same species. Generally, the price paid to the seed producer is 20% above commercial grain. In 1979, the market price for milling wheat was ₲ 25/Kg. The National Seed Advisory Committee set a maximum selling price for all seed classes (fiscalized, certified and registered) at ₲45/Kg. when treated with 'Tillex' and ₲55/Kg. when treated with 'Bayleton'.

The SENASE also sells horticultural seed from its retail store in San Lorenzo, which in 1979 amounted to 1,934 Kg. (Table 8). The primary purpose of this retail store, which sells mostly seeds imported from Chile, the US or Japan, is to provide a source of vegetable seeds at a reasonable price as an alternative to other sources.

Table 8. Distribution of Seeds of Other Crops. 1978/79.

CROP	VARIETY	AMOUNT KG.
English Peas	Cuarentona	1,500
Green Beans	Various	15
Watermelon	Sugar Baby	32
Lima Beans	Enana	67
Other Vegetables	--	320
Totals		9,634

Source: SENASE, 1979.

3.4. General Recommendations for the National Seed Program

Substantial progress has been made in Paraguay's seed program during the past eight years, especially when one considers that the SENASE's infrastructure has grown from a crowded small office and sales section to the modern and well equipped headquarters, seed testing laboratory and processing facilities. However, as in most countries, the development of a seed program takes place over a long period of time, allowing for modifications along the way. With this in mind, the following recommendations are made:

A. National Foundation Seed Program

The MAG should establish, equip and develop a national foundation seed program to assure a continuous input of high quality seeds of known genetic purity of the superior varieties into the seed multiplication system.

This is the single greatest need of the national seed program at present. This program should involve both research centers, IAN and CRIA. The National Foundation Seed Program should have the responsibility of multiplying breeder's seed up the the quantity required for larger scale production of registered and certified seed. Foundation seed could be produced on the research institution's own land, under contract through private growers, or a combination of the two. A small processing plant and bag drier could be constructed at both IAN and CRIA to handle different lots of foundation seed. Appropriate storage will also be required and a conditioned storage (low relative humidity and low temperature) will be required at both centers, where 15-25% of the normal seasonal demand for Foundation seed of each species and variety could be maintained as a safeguard against crop failure.

B. Varietal Descriptions

The breeders responsible should prepare a detailed morphological description of every variety recommended to Paraguayan farmers.

The key factor in a seed certification program is the assurance of varietal (genetic) purity. In the absence of a detailed description, which permits the SENASE field inspectors to distinguish among varieties, seed certification is of questionable value. Appendix V includes forms which are currently used in the USA for objective descriptions of soybeans, cowpeas and cotton varieties. Breeders could develop similar forms for other crops.

C. Seed Labeling

All seed which is sold, except farmer to farmer sales, should be fully labeled in accordance with the national seed law.

The main purpose of the label is to provide important information to the seed vendor and buyer concerning the physical and biological quality of the seed offered for sale. All seed handled by SENASE are analyzed by SENASE's seed testing laboratory, so the information for the tags is readily available. The authors observed that fiscialized seed at Cooperativa Colonias Unidas Ltda. did not provide information on the percentages of other crop seed, weed seed and inert matter, although, complete purity and germination analysis were conducted.

D. Personnel Training

At least one additional SENASE technician should receive academic training to the Masters degree level and in-country, on-the-job training should be intensified.

At present, there is no fully trained seed technologist in Paraguay. One SENASE employee is scheduled to complete his training (Ph.D. Seed Technology) in December, 1980. However, one trained person can not be expected to provide the complete technical reservoir necessary to resolve the many technically difficult problems associated with the development of a comprehensive seed program. (A list of possible training sites has been sent to the SENASE).

The in-country training course in seed testing was and will be beneficial. However, technically there appears to be a greater need for training in the areas of seed drying, processing, storage, marketing and management of these operations. Assistance in the development and execution of such courses (two-three weeks duration) is available through the USAID, FAO and CIAT. However, funds to cover local costs and participant expenses must be made available to the SENASE, possibly through PIDAP-II, in addition to its normal operational budget.

E. "Drill-Box" Survey

A national survey should be conducted to determine the exact quality of seeds of the major crops (except cotton) being planted by Paraguayan farmers.

To date, specific, factual data concerning the varieties, level of seed quality or the source of seed being planted is not available. This information is needed for effective planning of varietal development, foundation seed, seed certification, the SENASE and SEAG educational, and the private sector development programs. The SENASE field and seed testing laboratory personnel are fully capable of conducting such a survey and would gain valuable experience by their participation.

F. Short Term Credit for SENASE Seed Purchases

The Minister and SENASE Director should meet with BNF officials to develop some means of providing the SENASE with short term credit for use in purchasing seed immediately after seed harvest.

The timely availability of working capital is vital to the success of the SENASE program. The currently encountered two to three month delay in receiving money with which seed growers are paid, essentially, precludes effective planning for the national seed supply. Most seed producers can not wait to be paid for the seed they have produced since they are forced by banking regulations to sell all or part of their seed to pay their production loans. Clearly, the BNF would encur a minimum risk if it provided a line of credit at least equal to the grain market price for wheat, soybean and corn. The availability of a line of credit for a period of nine months should reduce the cost of seed approximately 10-12% and would, over time, permit the building of a "seed purchase revolving fund" within the BNF, MAG or SENASE.

APPENDIX IV

OBJECTIVE DESCRIPTION OF VARIETY
(Cowpea)

INSTRUCTIONS: See Reverse

NAME OF APPLICANT(S)	VARIETY NAME OR TEMPORARY DESIGNATION
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code)	FOR OFFICIAL USE ONLY PVPO NUMBER

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less.

1. PLANT HABIT AT GREEN SHELL STAGE: [ ] 1 = ERECT 2 = SEMIERECT 3 = PROCUMBENT 4 = PROSTRATE

2. PLANT SIZE: [ ][ ] CM. HIGH AT MATURITY

3. STEM COLOR: [ ] 1 = GREEN 2 = PURPLE

4. NODE COLOR: [ ] 1 = GREEN 2 = PURPLE

5. FOLIAGE: [ ] 1 = OPEN 2 = COMPACT

6. LEAF COLOR (See Reverse): [ ] 1 = LIGHT GREEN 2 = MEDIUM GREEN 3 = DARK GREEN

7. LEAF SURFACE: [ ] 1 = SMOOTH 2 = BLISTERED [ ] 1 = DULL 2 = GLOSSY

8. FLOWER COLOR (See Reverse) [ ] 1 = PURPLE 2 = LAVENDER 3 = TINGED 4 = WHITE

9. FIRST FLOWERING [ ][ ] NUMBER OF DAYS

10. POD:

[ ] PLACEMENT: 1 = BELOW FOLIAGE 2 = ABOVE FOLIAGE 3 = AT FOLIAGE LEVEL

[ ] LOCATION: 1 = SCATTERED 2 = BUNCHED

[ ][ ] CM. LONG [ ][ ] MM. WIDE

[ ] CURVATURE: 1 = STRAIGHT 2 = CURVED

[ ] CONSTRICTIONS: 1 = NONE 2 = SLIGHT 3 = DEEP

[ ] SURFACE (*Green shell maturity*): 1 = DULL 2 = GLOSSY

[ ] COLOR (*Green shell maturity*): 1 = SILVER-GREEN 2 = GREEN 3 = LIGHT PURPLE 4 = DARK PURPLE

[ ] COLOR (*Dry maturity*): 1 = WHITE 2 = STRAW 3 = DRAB 4 = PURPLE

[ ] CROSS SECTION (*Green shell stage-width/height*): 1 = (1: <) 2 = (1: >) 3 = (1:1)

11. SEED:

[ ][ ] NUMBER OF SEEDS PER POD

[ ] SHAPE (*See Reverse*): 1 = KIDNEY 2 = OVATE TO OVOID 3 = CROWDER 4 = GLOBOSE 5 = RHOMBOID

[ ][ ] MM. LONG

[ ][ ] MM. WIDE

[ ] HILAR EYE TYPE:

SPECKLED SLOTCH NARROW BIG SMALL VERY SMALL

[ ][ ][ ] GM. PER 1000 SEEDS

[ ] COAT: 1 = WRINKLED 2 = SMOOTH

[ ] COLOR PATTERN: 1 = SINGLE COLOR 2 = PATTERNED 3 = MARBLED 4 = SPECKLED

[ ] *PRIMARY COLOR (*Single color or basic color*): 1 = PURPLE 2 = BLACK 3 = DULL BLACK 4 = BLUE 5 = RED 6 = COFFEE 7 = MAROON 8 = BUFF OR CLAY 9 = PINK 0 = WHITE

SECONDARY COLORS PRODUCING THE PATTERN, MARBLING OR SPECKLING (Enter a zero in boxes where the colors do not identify the secondary colors.):

[ ] 1 = PURPLE [ ] 2 = BLACK [ ] 3 = DULL BLACK [ ] 4 = BLUE [ ] 5 = RED

[ ] 6 = COFFEE [ ] 7 = MAROON [ ] 8 = BUFF [ ] 9 = PINK [ ] 0 = WHITE

12. DISEASE (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ FUSARIUM WILT	☐ ROOT KNOT NEMATODE	☐ CHARCOAL ROT	☐ ZONATE LEAF SPOT
☐ RED LEAF SPOT	☐ POWDERY MILDEW	☐ COWPEA CHLOROTIC MOTTLE VIRUS	☐ SOUTHERN BEAN MOSAIC VIRUS
☐ BEAN YELLOW MOSAIC VIRUS	☐ CUCUMBER MOSAIC VIRUS	☐ BEAN POD MOTTLE VIRUS	☐ SOYBEAN CYST NEMATODE
☐ COWPEA YELLOW MOSAIC VIRUS	☐ BACTERIAL CANKER	☐ CERCOSPORA LEAF-SPOT	☐ STING NEMATODE
☐ RUST	☐ SOUTHERN BLIGHT	☐ ROOT ROT	☐ OTHER *(Specify)*_____

13. INSECT (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ MEXICAN BEAN BEETLE	☐ COWPEA APHID	☐ COWPEA CURCULIO	☐ STINK BUGS
☐ LESSER CORNSTALK BORER	☐ EUROPEAN CORNBORER	☐ CORN EARWORM	☐ BEET ARMYWORM
☐ THRIPS	☐ SERPENTINE LEAF MINERS	☐ OTHER *(Specify)* _____	

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant size		Plant habit	
Pod size		Plant pigmentation	
No. days to maturity		Seed coloration	

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for completing this form:

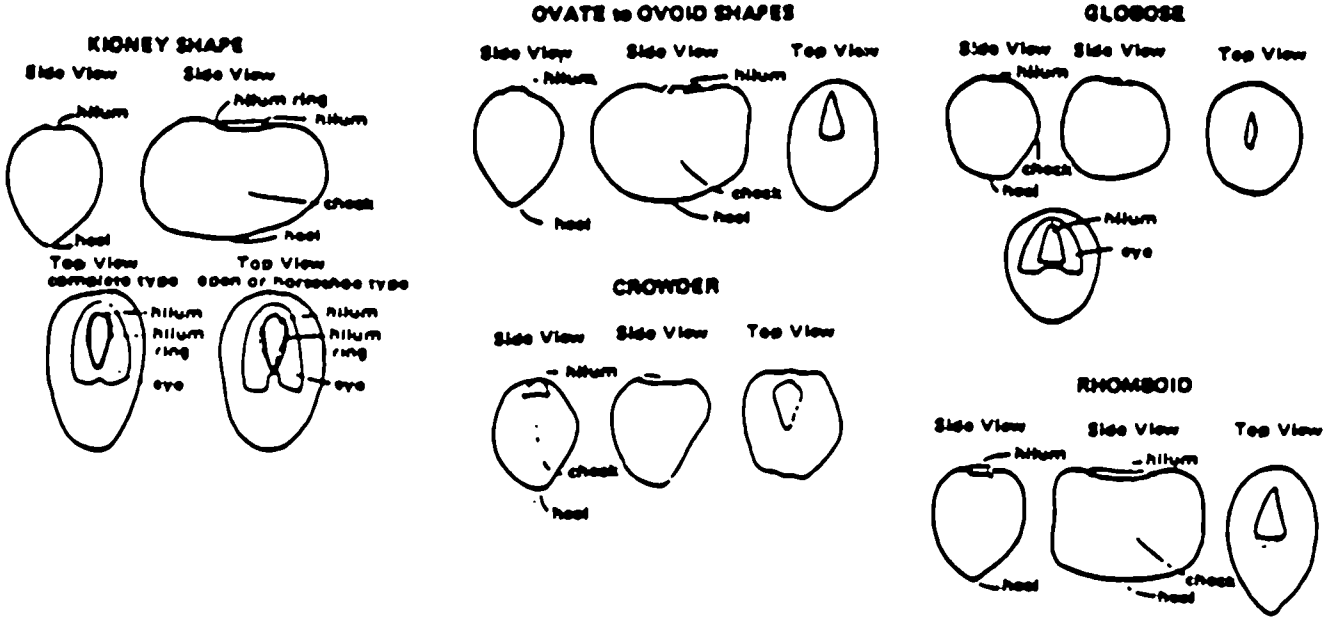
1. C. V. Piper, 1912, Agricultural Varieties of Cowpea and Related Species, U.S.D.A., Bulletin No. 229.
2. L. L. Ligon, 1958, Characteristics of Cowpea Varieties, Oklahoma St. te University, Bulletin B-518.
3. W. J. Spillman and W. J. Sando, 1929, Mendelian Factors in the Cowpea, papers of the Michigan Academy of Science, Arts and Letters, Vol. XI.

LEAF COLOR: Any recognized color chart may be used to determine the leaf color of the described variety. The following cowpea varieties may be used as a guide to identify colors listed:

1. Light Green - Texas Cream 40 2. Medium Green - Big Boy
3. Dark Green - California Blackeye #5.

FLOWER COLOR: White flower should be treated with a one percent solution of hydrochloric acid to determine if anthocyanin is present. If color appears as a result of the test, classify as pinked.

TERMS USED TO DESCRIBE SHAPES:



OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (*GLYCINE MAX*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)

ADDRESS (*Street and No., or R.F.D. No.; City, State, and ZIP Code*)

FOR OFFICIAL USE ONLY

PVPO NUMBER

VARIETY NAME OR TEMPORARY DESIGNATION

Place the appropriate number that describes the varietal character of this variety in the boxes below.

1. SEED SHAPE:
   [ ] 1 = SPHERICAL 2 = SPHERICAL FLATTENED 3 = ELONGATE 4 = OTHER (*Specify*)

2. SEED COAT COLOR:
   [ ] 1 = YELLOW 2 = GREEN 3 = BROWN 4 = BLACK 5 = OTHER (*Specify*) _____
   SHADE: [ ] 1 = LIGHT 2 = MEDIUM 3 = DARK

3. SEED COAT LUSTER:
   [ ] 1 = DULL 2 = SHINY

4. SEED SIZE
   [ ][ ] GRAMS PER 100 SEEDS

5. HILUM COLOR:
   [ ] 1 = BUFF 2 = YELLOW 3 = BROWN 4 = GRAY 5 = IMPERFECT BLACK 6 = BLACK 7 = OTHER (*Specify*)
   SHADE: [ ] 1 = LIGHT 2 = MEDIUM 3 = DARK

6. COTYLEDON COLOR:
   [ ] 1 = YELLOW 2 = GREEN

7. LEAFLET SIZE (*See Reverse*):
   [ ] 1 = SMALL 2 = MEDIUM 3 = LARGE

8. LEAFLET SHAPE:
   [ ] 1 = OVATE 2 = OBLONG 3 = LANCEOLATE 4 = ELLIPTICAL 5 = OTHER (*Specify*)

9. LEAF COLOR (*See reverse*):
   [ ] 1 = LIGHT GREEN 2 = MEDIUM GREEN 3 = DARK GREEN

10. FLOWER COLOR:
    [ ] 1 = WHITE 2 = PURPLE 3 = OTHER (*Specify*)

11. POD COLOR:
    [ ] 1 = TAN 2 = BROWN 3 = BLACK

12. POD SET:
    [ ] 1 = SCATTERED 2 = CONCENTRATED

13. PLANT PUBESCENCE COLOR:
    [ ] 1 = GRAY 2 = BROWN 3 = OTHER (*Specify*)
    SHADE: [ ] 1 = LIGHT 2 = MEDIUM 3 = DARK

14. PLANT TYPES (*See Reverse*):
    [ ] 1 = SLENDER 2 = BUSHY 3 = INTERMEDIATE

15. PLANT HABIT:
    [ ] 1 = DETERMINATE 2 = INDETERMINATE 3 = OTHER (*Specify*)

16. HYPOCOTYL COLOR:
    [ ] 1 = GREEN 2 = PURPLE

17. SEED PROTEIN:
    [ ] 1 = A 2 = B

18. NUMBER OF DAYS TO FLOWERING (*Place a zero in first box (e.g. [0][9]) when days are 9 or less.*)
    [ ][ ]

19. MATURITY GROUP:
    [ ] 1 = 00 2 = 0 3 = I 4 = II 5 = III 6 = IV 7 = V 8 = VI 9 = VII 10 = VIII

20. SIZE OF 10 DAY OLD SEEDLING GROWN UNDER CONSTANT LIGHT (*Growth Chamber*) AT 25° C. (*Place a zero in first box (e.g. [0][2]) when size is 9 mm. or less.*)
    [ ][ ][ ] MM. LENGTH OF SEEDLING [ ][ ] MM. LENGTH OF COTYLEDON [ ][ ] MM. WIDTH OF COTYLEDON

21. DISEASE. (*Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant*)

[ ] BACTERIAL PUSTULE	[ ] SOYBEAN CYST	[ ] DOWNY MILDEW	[ ] PURPLE STAIN	[ ] POD AND STEM BLIGHT	[ ] ROOT KNOT
[ ] FROGEYE	[ ] STEM CANKER	[ ] PHYTOPHTHORA	[ ] BROWN STEM ROT	[ ] TARGET SPOT	[ ] BROWN SPOT
[ ] BUD BLIGHT	[ ] WILDFIRE	[ ] RHIZOCTONIA ROT	[ ] OTHER (*Specify*)		

FORM GR-470-2 (REVERSE)

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant shape		Petiole angle	
Leaf shape		Seed size	
Leaf color		Seed shape	
Leaf surface		Seedling pigmentation	

22. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY

VARIETY	NO. OF DAYS TO MATURITY	LODGING SCORE	PLANT HEIGHT	LEAF SIZE		CONTENT		AVERAGE NO. OF PODS PER PLANT	IODINE NO.
				Width	Length	Protein	Oil		
Submitted							%		
Name of similar variety									

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for completing this form:

1. Scott, Walter O. and Samuel R. Aldrich, 1970, Modern Soybean Production, The Farmer Quarterly.
2. Norman, A. G., 1963, The Soybean: Genetics, Breeding, Physiology, Nutrition, Management.
3. McKie, J. W., and K. L. Anderson, 1970, The Soybean Book.

LEAF COLOR: Nickerson's or any recognized color fan may be used to determine the leaf color of the described variety. The following Soybean varieties may be used as a guide to identify the colors listed on the form.

COLOR	VARIETY
Light Green	"Ada"
Medium Green	"Wilkin"
Dark Green	"Swift"

LEAF SIZE: The following varieties may be used as a guide to identify the relative size leaves.

SIZE	VARIETY
Small	"Amsoy"
Medium	"Bonus"
Large	"Anoka"

PLANT TYPE: The following varieties may be used as a guide to identify the plant type.

TYPE	VARIETY
Slender	"Vansoy"
Intermediate	"Wirth"
Bushy	"Adelphia"

OBJECTIVE DESCRIPTION OF VARIETY
COTTON (*GOSSYPIUM SPP.*)

INSTRUCTIONS: See Reverse.

FOR OFFICIAL USE ONLY

PVPO NUMBER

VARIETY NAME OR TEMPORARY DESIGNATION

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. SPECIES:

[ ] 1 = GOSSYPIUM HIRSUTUM 2 = GOSSYPIUM BARBADENSE

2. AREA(S) OF ADAPTION (0 = Not Tested, 1 = Not Adapted, 2 = Adapted)

[ ] EASTERN [ ] DELTA [ ] CENTRAL [ ] HIGH PLAINS [ ] EL PASO AREA
[ ] WESTERN LOW HOT VALLEYS [ ] SAN JOAQUIN [ ] OTHER (Specify) _____

3. MATURITY (50% Open Boll):

[ ][ ] NO. OF DAYS *EARLIER* THAN ..... [ ]
[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ]

1 = COKER 310 2 = DELTAPINE 16 3 = STONEVILLE 213
4 = PAYMASTER 111 5 = ACALA 1517-70 6 = ACALA SJ-1
7 = LANKART 57 8 = OTHER (Specify) _____

4. PLANT HABIT

[ ] 1 = SPREADING 2 = INTERMEDIATE 3 = COMPACT

[ ] 1 = FOLIAGE SPARSE 2 = DENSE
3 = OTHER (Specify) _____

5. PLANT HEIGHT:

[ ][ ] CM. *SHORTER* THAN ..... [ ]
[ ][ ] CM. *TALLER* THAN ..... [ ]

1 = COKER 310 2 = DELTAPINE 16 3 = STONEVILLE 213
4 = PAYMASTER 111 5 = ACALA 1517-70 6 = ACALA SJ-1
7 = LANKART 57 8 = OTHER (Specify) _____

6. MAIN STEM:

[ ] 1 = LAX 2 = ASCENDING 3 = ERECT

[ ] CM. TO FIRST FRUITING BRANCH

[ ][ ] NO. OF NODES TO FIRST FRUITING BRANCH (from cotyledonary node)

7. LEAF:

[ ][ ] CM. WIDTH OF WIDEST LEAVES AT MATURITY

8. LEAF PUBESCENSE:

[ ] 1 = GLABROUS (HAIRS AS SPARSE AS O_2 SMOOTH)
2 = SMOOTH LEAF (DELTAPINE SMOOTH LEAF) 3 = PUBESCENT (STONEVILLE 213)
4 = HEAVY PUBESCENCE (H_1 OR H_2) 5 = OTHER (Specify) _____

9. LEAF COLOR:

[ ] 1 = VIRESCENT YELLOW 2 = LIGHT GREEN 3 = DARK GREEN (*Acala-442*) 4 = RED
5 = OTHER (Specify) _____

10. LEAF TYPE:

[ ] 1 = NORMAL 2 = OKRA 3 = SUPER OKRA 4 = OTHER (Specify) _____

11. FLOWER:

[ ] 1 = NECTARILESS 2 = NECTARIED

[ ] Petals: 1 = CREAM 2 = YELLOW [ ] Pollen: 1 = CREAM 2 = YELLOW

12. FRUITING BRANCH TYPE:

[ ] 1 = CLUSTER 2 = SHORT 3 = NORMAL [ ] 1 = DETERMINATE 2 = INDETERMINATE

13. GOSSYPOL CONDITION:

[ ] 1 = GLANDLESS 2 = REDUCED GLANDS 3 = NORMAL GLANDS
4 = OTHER (Specify) _____

[ ] 1 = NORMAL BUD GOSSYPOL
2 = HIGH BUD GOSSYPOL

14. SEEDS:

[ ][ ][ ] ± [ ][ ] SEED INDEX (Fuzzy seed basis) [ ] Seed Fuzz: 1 = SPARSE (GREGG 38) 2 = MODERATE (DPL-16)
3 = HEAVY (ACALA SJ-1) 4 = OTHER (Specify) _____

☐ Locules: 1 = 3-4 2 = 4-5 ☐☐ NO. SEEDS PER BOLL ☐☐☐ LINT PERCENT ☐☐ MM. DIAMETER

☐ Pitted: 1 = NONE 2 = FINELY 3 = COURSELY ☐☐☐ GRAMS SEED COTTON PER BOLL ☐ Breadth: 1 = BROADER AT BASE 2 = BROADER AT MIDDLE

☐ Type: 1 = STORMPROOF (WESTBURN 70) 2 = STORM RESISTANT (LANKART 57) 3 = OPEN (DELTAPINE 16) ☐ Shape: 1 = LENGTH < WIDTH 2 = LENGTH = WIDTH 3 = LENGTH > WIDTH

16. BRACTEOLES:

☐ Breadth: 1 = LENGTH < WIDTH 2 = LENGTH = WIDTH 3 = LENGTH > WIDTH

☐ Teeth: 1 = FINE 2 = COURSE ☐ Teeth: 1 = 3-4 2 = 5-7 3 = 8-10 4 = OTHER (Specify) _____

17. YIELD: Compared to

☐☐☐ PERCENT *LESS* THAN ..... ☐

☐☐☐ PERCENT *MORE* THAN ..... ☐

1 = COKER 310 2 = DELTAPINE 16 3 = STONEVILLE 213 4 = PAYMASTER 111 5 = ACALA 1517-70 6 = ACALA SJ-1 7 = LANKART 57

18. FIBER LENGTH (Complete one or more of the following and give the method):

☐☐☐ SPAN LENGTH 50% ☐☐☐ SPAN LENGTH 2.5% ☐☐☐ U.H.M. LENGTH

☐☐☐ MEAN LENGTH ☐☐ STAPLE LENGTH 32nd INCHES

☐☐ UNIFORMITY RATIO (MEAN/U.H.M.) ☐☐ UNIFORMITY INDEX (50% SPAN/2.5% SPAN)

19. FIBER STRENGTH AND ELONGATION:

☐☐☐ 1,000 P.S.I. ☐☐☐ ELONGATION E_1 ☐☐☐ STILOMETER T_0

☐☐☐ MICRONAIRE READING ☐☐☐ YARN STRENGTH (Give test method) _____ ☐☐☐ STILOMETER T_1

20. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ VERTICILLIUM WILT ☐ FUSARIUM WILT ☐ ROOT KNOT NEMATODE ☐ BACTERIAL BLIGHT (Race 0)

☐ BACTERIAL BLIGHT (Race 2) ☐ ASCOCHYTA BLIGHT ☐ PHYMATOTRICHUM ROOT ROT ☐ RHIZOCTONIA

☐ ANTHRACNOSE ☐ RUST ☐ OTHER (Specify) _____

21. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ BOLL WEEVIL ☐ APHID ☐ FLEAHOPPER ☐ LEAFWORM

☐ FALL ARMYWORM ☐ GRASSHOPPER ☐ LYGUS ☐ PINK BOLLWORM

☐ STINKBUG ☐ THRIP ☐ CUTWORM ☐ SPIDERMITE

☐ OTHER (Specify) _____

REFERENCES: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(1) Brown, Harry B., and J. O. Ware, 1958. Cotton, McGraw-Hill Book Company, Inc., New York.

(2) Lewis, C. F., and H. H. Ramey, Jr., 1971. 1970 Regional Cotton Variety Tests, ARS 34-130, United States Department of Agriculture.

COLORS: Nickerson's or any recognized color fan may be used to determine flower color of the described variety.

4.0 SEED PROCESSING FACILITIES - PIDAP-II

The SENASE seed processing facility at San Ignacio was constructed with funds provided by the PIDAP-I. At the request of both SENASE and PIDAP personnel, the consultants and representatives of these both agencies made a detailed inspection of the facilities and its operation for the purpose of making observations and recommendations for corrections and improvements in this facility.

4.1. Observations

1. Seed Drying Facilities

a. When the batch drying bins were designed an open area was left in the upper part of the building below the roof line to allow escape of the air forced through the mass of seed. However, due to the strong winds that occur during some thunderstorms, water is blown into the bins. To prevent this, the open area was covered with wood paneling. As a result the rain no longer falls into the bins but the "wet" air cannot escape.

b. To reduce equipment costs, due to the limited funds which were available, only one fan was installed to serve each two drying bins. This design required that shut-off gates be placed in the transition ducts between the fan unit and phlenum chamber. These shut-off gates were not installed. Thus, when the fan is running and only one of the bins is loaded with seed, the air is diverted to and passes through the bin with the least static pressure making seed drying impossible.

c. Because of inadequate weather cover over the walk-ways where the fans are located, rain is pulled into the fan which blows water into the bin plenum chambers.

2. Seed Processing Plant

a. Neither air-screen cleaner makes an adequate air separation. The problem is in the installation of the junction unit between the cleaner fans and the air-duct system going to the dust-collectors outside.

b. The lower fan adjustable pulley of the air-screen cleaner in processing line "B" was frozen-open. No adjustment of the air could be made.

c. Some pieces of equipment, seed treaters, cylinder separator and seed baggers, which must be moved periodically must be carried by hand.

3. Storage Warehouse

a. The seed storage warehouse area is 3000 M^2. It is covered with a sheet metal roof that absorbs a large amount of heat. When built, little ventilation was provided, and as a consequence the temperature inside the building is approximately 10^0C higher than outside temperature which often reaches 35-40C on sunny day. Such high temperatures are harmful to the seed and very uncomfortable to the workers.

b. Due to the lack of a proper drainage system, rain water flows into the warehouse. This is also true for the conveyor trench between the drying unit and processing plant.

c. With only two years of use, the floors have cracked to the extent that it is difficult to transport seed by even hand trucks from the processing plant to the storage warehouse.

4.2. Recommendations

The necessary improvements and repairs of SENASE's seed facilities will be made with funds of the seed sub-project of the PIDAP II. For this reason the recommendations were divided as follows: (a) main priority, which includes those improvements essential to proper performance of the facilities, and (b) secondary priority, which are those improvements that assure safer operation of the equipment and the solution of less serious problems. The responsible PIDAP officials have been provided with a list of these recommendations.

1. Main Priority

a. Seed Storage Warehouse

(1) Provide sufficient ventilation to the seed storage warehouse by replacing the actual brick in the upper 60 cm. of wall below the concrete joist, with perforated brick or hallow tube (conboco 20 cm. minimum length), at approximately a 45^0 angle. (See Fig. 1, Appendix IV).

(2) Install turbine or siphon ventilators to remove the stratified warm air underneath the roof.

(3) Replace nails used to support roof by metal hooks that are tied to the rafters.

(4) Remove old floor (in the areas of main traffic) and replace by 15cm. deep, good quality, reinforced concrete beginning at the bagging area in the processing plant, going all the way to the south end of the warehouse and from door to door across the width of the warehouse.

(5) Cover the outside of the warehouse walls with a waterproof plaster, such as silicon containing-plaster.

(6) Provide good drainage around all buildings, particularly the east and west sides of the warehouse. For this purpose the land surrounding the facilities should be surveyed and permanent channels constructed to move water away from the buildings.

b. Seed Drying Facility

(1) Remove wood paneling in the second floor, and replace with perforated brick (conboco, 20 cm. minimum length) See Figure 1, Appendix IV for an example of the type installation recommended.

(2) Install shut-off gates in the branched ducts between the fan unit and phlenum chambers, making sure that when only one bin is loaded, the gate in the transition that joins the fan to the empty bin is closed.

(3) Raise the cover for the walk-way between the drying facility and the processing plant to clear the doors and extend it at least one meter (1.00m) on each side.

(4) Prevent the rain from getting into the drying fans by putting a weather cover in front of the fan inlet. (See Figure 2, Appendix IV).

c. Processing Plant

(1) Correct the installation of the air ducting between the cleaner fans and the duct to the dust collector, placing a transition with a divider at least one meter (1.00M) long in each duct. (Construction details supplied separately to SENASE).

(2) Repair the lower-air adjustable pulley in the cleaner (item No. 31 of the original engineering drawings).

2. Secondary Priority - General

a. Install wooden or metal covers for all floor pits and the conveyor trench.

b. Open the floor pit behind the electric motor that activates the vibrating conveyor (item No. 13 of original drawings) to allow sufficient ventilation, the wall should be at least 15 cm. from the motor's air inlet.

c. Install electrical outlets, 220 V. at ten meter (10.00 M) intervals along in the walls of the processing plant and the warehouse.

d. Provide outside illumination, using mercury-vapor lights mounted on concrete poles. Wiring should be placed underground.

e. Install a 5.50 M.-high metal roof above the truck scale area and enlarge the weighing office. An automatically controlled sump-pump should be installed to remove water that accumulates in the pit. The floor of the scale pit should be slightly sloped toward the sump-pump.

f. Provide a weather overhang in front of the office area.

g. Construct an approximately 10 x 10m concrete seed drying patio in a location convenient to the reception area.

h. Repair the road used by trucks within SENASE's property, giving preference to a gravel road from the entrance to the receiving area and around the warehouse. A cattle guard should be placed at the compound entrance.

i. Install heavy duty neoprene swivel casters with brakes on the frames that support treaters, baggers and the cylinder separator.

j. Build dump-hoppers for the down-leg side of both receiving elevators in which to dump seed brought in bags.

k. Convert the fumigation room located in the warehouse into a cold storage room. The storage room should be adequate to store small lots of seed for a period of 18 to 24 months, by placing a vapor barrier material (asphalt paint, aluminum or plastic film, etc.) on the walls, floor and ceiling, to prevent moisture migration inside the room. Good insulating material such as isopor (10cm. thick or other material with equivalent "R" value) should also be placed on walls, floor and ceiling, to slow down heat migration. SENASE has a dehumidifier capable of removing the moisture from the air. Two (2) air conditioning units are being requested for this room under the PIPA project.

Ambient conditions in the storage room should be kept at 20°C and 50% relative humidity. To insure these conditions a refrigeration type door should be used instead of the present wooden door. An illustration of a typical installation of a conditioned storage room is found in Fig. 3, Appendix IV.

l. Contact the Department of Highways and roads to determine the possibility of its building a bridge across the ditch adjacent to the entry to the SENASE compound.

Installation of Conboco for Ventilation

Seed Storage Warehouse

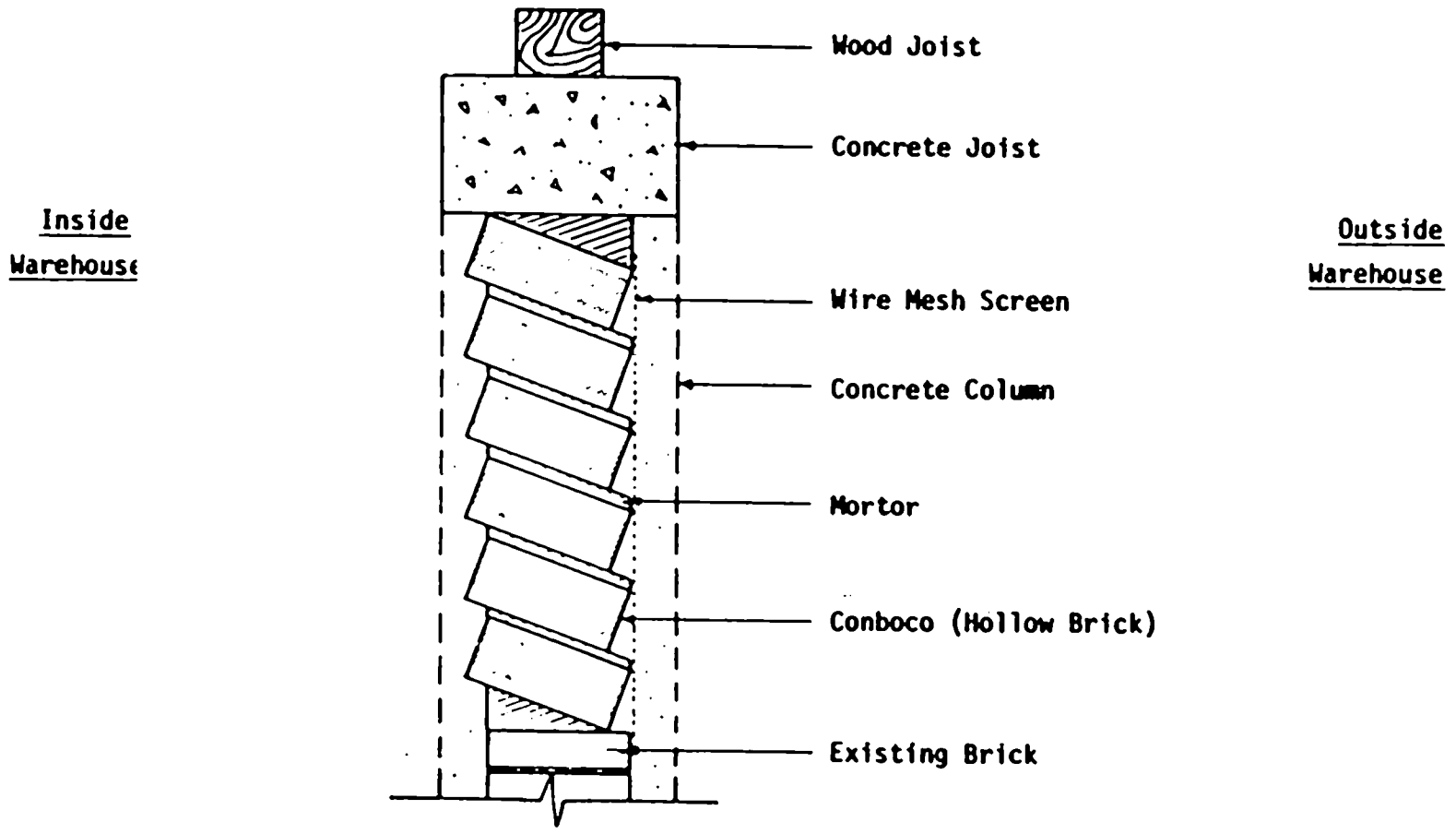


Figure 1. Installation of hollow brick in walls of warehouse to provide ventilation.

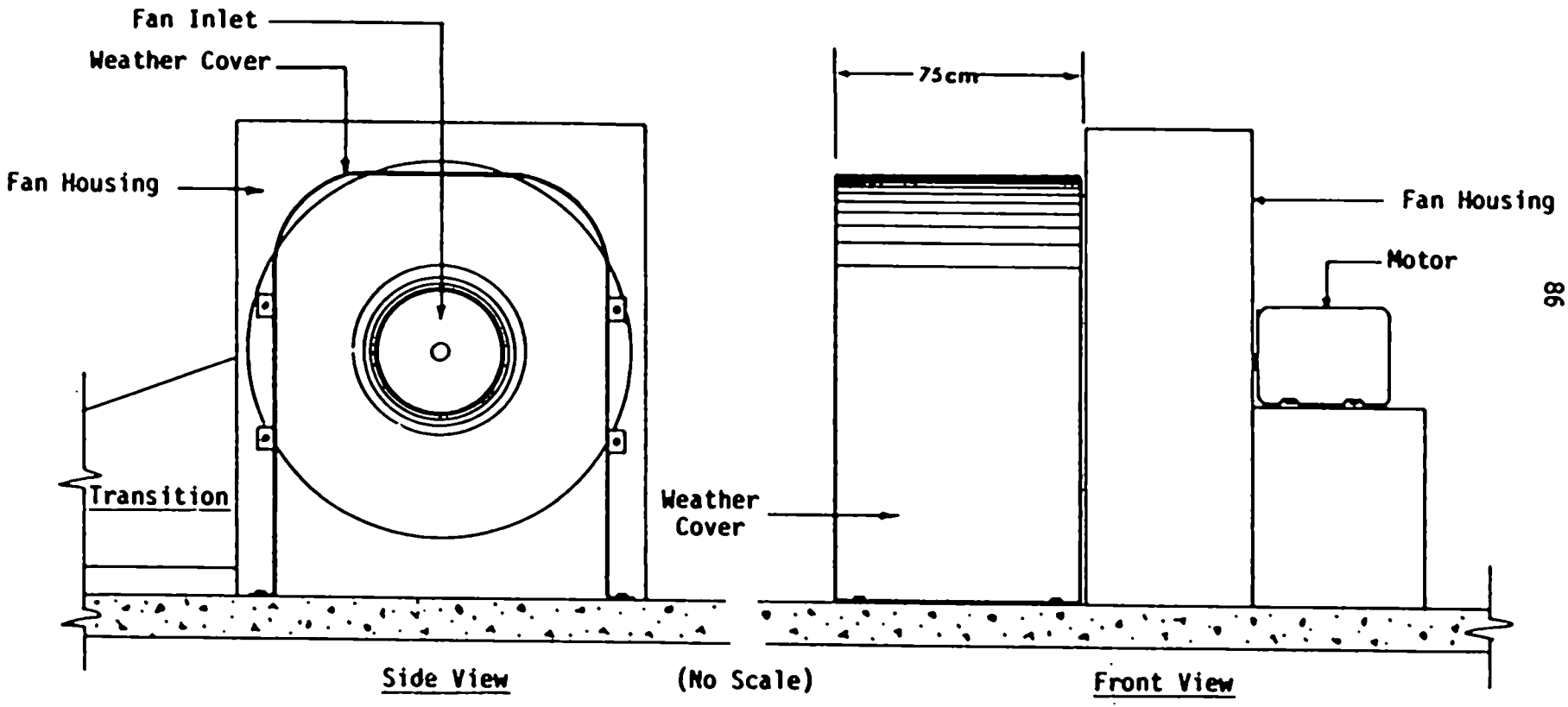
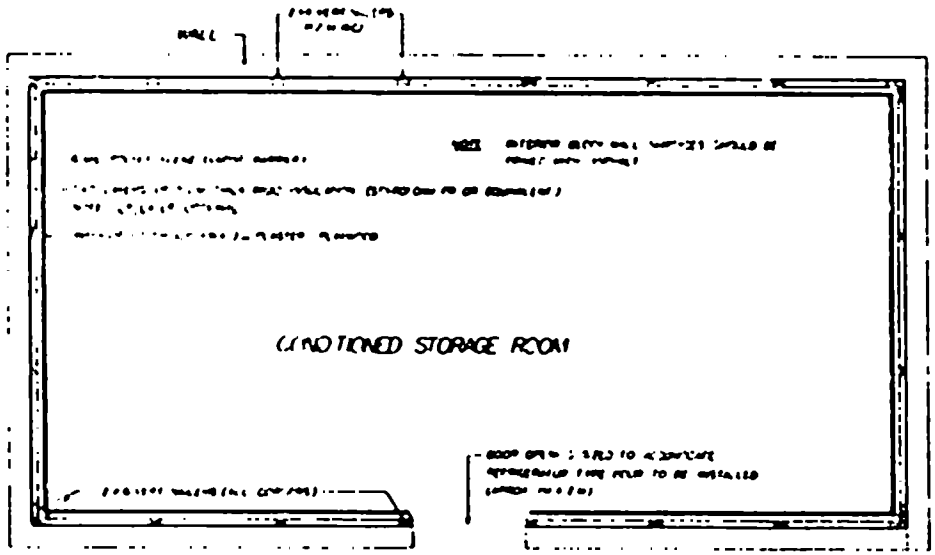
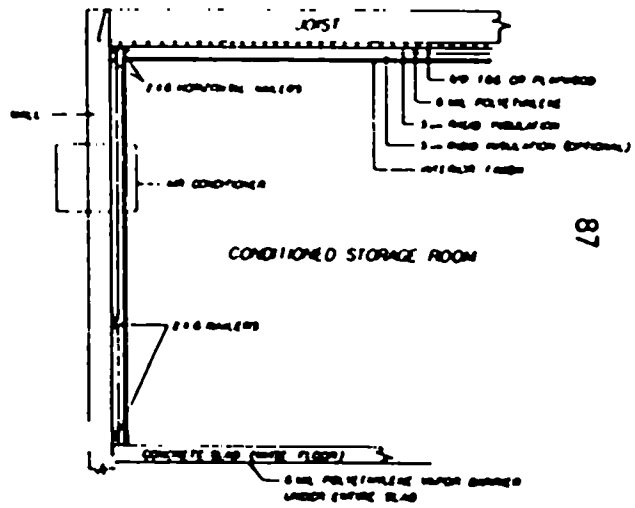


Figure 2. Illustration of the installation of a weather cover for drying fans.



PLAN VIEW



SIDE VIEW

Figure 3. Installation of Insulation and Vapor Barier for Conditioned Storage Room in San Ignacio.

APPENDIX VI

Persons Contacted Officially

I. Ministry of Agriculture

Name	Position
Hernando Bertoni	Minister
Carlos Arias	Architect
Carlos Banchero	Civil Engineer

I.a. Forestry, Agriculture Research and Extension Department/MAG

Luis Alberto Alvarez	Director
Raul Torres	Technician

I.b. Agriculture and Livestock Extension Service/MAG

Juan Molinas	Director
Wildo Perez Quintana	Technician
Ruben Villamayor	Administrator PIPA

I.c. Technical Coordination Secretariat/MAG

Nelson de Barros	Executive Secretary of International Coordination-PIDAP
Luciano Lezcano	Sub-Secretary
Victorino Cardozo	World Bank Consultant

I.d. National Seed Service

Ramon Artecona	Director
Jose Maricevich	Chief, Production & Marketing
Carlos Pfingst	Chief, Processing
Baldomero Valinotti	Technician
Pastor Arias	Technician
Emiliano Cardozo	Technician
Manuel Caballero	Technician

II. USAID/P

Dr. Paul Montovan	Mission Director
Dr. Larry Laird	Rural Development Officer
Oscar Carvallo	Administrative Assistant
David L. Alverson	Economist

III. Colonias Unidas Agricola Ltda Co-op.

Arnildo Schneider	Chief, Production
Ramon L. Sedy	Seed Technician

APPENDIX VII

Consultants Activities

T	Feb. 12	Arrive Asuncion
W	Feb. 13	Discussions with USAID/P-RDO Personnel. Preliminary meeting with SEAG personnel.
Th	Feb. 14	Visited SENASE headquarters at San Lorenzo. Meeting with SENASE and SEAG personnel
F	Feb. 15	Visited SENASE's seed drying, processing and storage facilities at San Ignacio, Misiones
S	Feb. 16	Visited Colonias Unidas Agricola Ltda. Co-op at Obligado. Itapua. Meeting with their seed specialist, Production Manager and SENASE's technicians.
M	Feb 18	Meeting in San Ignacio with MAG personnel including SENASE's Director and MAG's architect to evaluate actual problems in the seed facilities.
T	Feb. 19	Accumulation of data to develop PIPA budget. Meeting with SENASE's director and other technicians and SEAG's director
W	Feb. 20	Accumulation of data to develop SENASE/PIPD budgets. Meeting with SENASE's and SEAG's technicians.
Th	Feb. 20	Meeting with SENASE's and SEAG's technicians.
F	Feb. 21	Meeting with SENASE's and SEAG's technicians.
M	Feb. 25	Development of budgets for PIPA project.
T	Feb. 26	Development of budgets for PIPA project.
W	Feb. 27	Meeting with the Minister of Agriculture. Final meeting with SEAG's and SENASE's personnel, and USAID/P Rural Development Officer, to discuss recommendations.
Th	Feb. 28	Return to MSU