5. IMPROVED PLAN FOR THE MODEL AREA

5.1 Farm and Harvesting Machinery

The improved plan of farm and harvesting machinery distribution is provided based on the following conditions for government and private sector in the model areas. And the summary of the basic improved plan is shown in Table F.5.1

(1) The farm and harvesting machinery provided under ESPDP exceeded, it's life span will be worn out within a few years. So the whole machinery shall be renewed.

(2) The farms of government sector cultivate not only the objective crop seed but also the experimental crops. The distribution plan for the machinery is provided based on the whole cultivating area for seed production and experimental cultivation to avoid the disturbance of delayed cultivation works of experimental cultivation from the smooth seed production works.

(3) The machinery provided shall be selected within the machinery which does not change the present works of seed production so much to avoid the lowering of the effectiveness of machinery newly introduced.

(4) The machinery strongly required by the farms of government sectors will be considered to be involved in the plan unless the load of operators does not exceed their capacity.

(5) The farm machinery for the private sector support is not required basically, but some seed harvesting machinery will be considered to be involved in the plan for the private sector support to improve seed quality.

(6) The number of machinery is desired based on the cultivating area shown in Table f in accordance with the standard shown in section 3.

Standing on the bases above the improved plan is provided as follows.

Machinery	Ilagan ES	Reg. II Private	Visayas ES	Reg. VI Private	Davao NCC	Tupi ES	Reg. XI Private
Tractor (60PS)	2	–	–	–	1	1	–
Tractor (35PS)	–	–	2	–	–	–	–
Tractor (15PS)	2	–	–	–	–	–	–
Power Tiller (7PS)	3	–	2	–	2	2	–
Disc Plow	2	–	1	–	1	1	–
Scraper	2	–	1	–	–	–	–
Disc Harrow	2	–	–	–	1	1	–
Trailer	4	–	4	–	2	2	–
Rotary	2	–	2	–	–	–	–
Sprayer	10	–	10	–	10	10	–
Corn Seeder	–	–	–	–	1	1	–
Wider	–	–	5	–	–	–	–
Thresher	2 (peanuts)	5 (peanuts)	2	4	–	–	–
Corn Sheller	–	–	–	–	2	1	5

5.2 Seed Processing Machinery and Facilities

The improved plan of the seed processing machinery and facilities distribution is also provided based on the conditions mentioned below.

(1) Among the machinery provided under ESPDP, a part of the machinery which has been utilized well shall be entirely renewed, but the other machinery which has not been utilized well shall not be renewed though the life span is exceeded.

(2) The capacity of the facilities should conform with the bigger volume of seeds in either the dry season or wet season which is required to process in the farms.

(3) The capacity of dryers should conform with the volume of wet season seeds to be processed in the farms. But the artificial drying method is recommended for the dry season seeds to minimize the sun drying method. Since the budget for the provision of fuel for dryer is always a problem; the dryers for peanuts and corn will be selected basically from the models of the dryer types biomass, such as empty corn cobs fuel, and for the rice from rice hush fuel type.

(4) The fuel for drying in private sector is also one of the constraints to the economic seed processing. However, a suitable small scale bio-mas fuel dryer for the private sector is not developed yet, so the dryer for the rice seed requiring small scale dryer will be selected the kelosen fueled type. The dryer for peanut seeds in the private sector will be selected from the bio-mas fueled type because a rather large capacity is required than the government sector.

(5) The private corn seed producer is recognizing the necessity of drying seed recently, however the appropriate dryer to reply to this request is not manufactured so far. Consequently the dryer for corn seed is not considered to be involved in this plan.

(6) The type and number of seed drying and processing machinery are desired on the base of careful consideration of the number of variety of seeds processed.

Standing on the view point of the above plan is shown as followed.

Machinery	Ilagan ES	Reg. II Private	Visayas ES	Reg. VI Private	Davao NCC	Tupi ES	Reg. XI Private
Dryer	3 t X1	10 t X1	2.8 t X6	2.8 t X4	1 t X1	1 t X1	–
Seed Separator	–	–	–	0.5TPH X4	–	–	0.5TPH X5
Seed Processing Plant	0.5TPH X1	1TPH X1	1TPH X2	–	0.5TPH X1	–	–

5.3 Cold Storage

As shown in the improved plan for the production and distribution of seeds, each farms of government sector has to store a part of foundation and register seeds as the buffer seed and surplus seeds for about one year. And it has to store also a part of certified peanut seeds for about one year.

Considering the above mentioned situation, the improved plan for the distribution of air-conditioned storage is shown as follows basically.

(1) The capacity of air-conditioned storage is designed to conform the volume of seeds required for one-year storage according to the improved seed distribution plan.

(2) The conditions of air-conditioned storage is designed to minimize the operation cost.

(3) The sorts of seed stored in the air-conditioned storage are a part of foundation and registered seed of 3 objective crops, and a part of certified seeds of peanut seeds.

(4) The storage period shall be within one year basically for each seed. However the foundation and registered seeds of peanuts shall be considered to be stored over one

year to three years in accordance with the actual supply of upper class seeds of which supply is unstable.

(5) The storage conditions are as follows.

For foundation and registered seed of peanuts	:	15°C - 40%RH
For foundation and registered seed of rice and corn, and certified seed of peanuts	:	18°C - 60%RH

The temperature of storage room atmosphere shall be as high as possible within the above conditions to avoid dew on the surface of seeds when the seeds are taken out from the storage room.

(6) Each storage room shall have the ante room to warm up seeds without getting dew before taking out.

(7) The storage facilities shall be divided into plural rooms in accordance with the delivery schedule of seeds, so that the idle storage room can be cut off the operation.

(8) The storage facilities consist of heat insulated panels, unit cooling systems and dehumidifying devices.

Conditions	Ilagan ES	Reg. II Private	Visayas ES	Reg. VI Private	Davao NCC	Tupi ES	Reg. XI Private
15°C - 40%RH	45 m^3 X2	–	–	–	–	–	–
18°C -60%RH	45 m^3 +210 m^3	–	36 m^3 X3	–	22.5 m^3 X1	22.5 m^3 X1	–

5.4 Seed Transportation Equipment

The government sector has to store the buffer seed of objective seed in each model area, but each farm of government sector can not produce sufficiently the required quantity to the objective model area. The deficient quantity shall be supplemented by the seed produced in the private sector. Particularly most of buffer stock of certified seed shall be produced in the private sector. Since these seeds shall be gathered to the government sector facilities from the private sector, the seed transportation equipment is required. For the purpose of the

above, distribution improved plan for seed transportation equipment is provided on the base of the following conditions.

(1) For long distance transportation in the objective area, 6 tons capacity of medium scale cargo trucks are distributed.

(2) For medium distance, 2 tons small scale cargo trucks are distributed.

(3) For short distance transportation of seed, communication between the seed producers of government and private sector and the other small things of agricultural input, 1 ton capacity of pick-up trucks are distributed.

(4) The number of vehicles are desired to conform to the seed quantity handled in each government sector farm.

(5) Ilagan ES as the farm of peanuts seed producer and storage will have 2 sites of certified seed production in the remote area, therefore each medium scale cargo truck is distributed for both sites.

Considering the above conditions, the plan is provided as follows.

Class	Ilagan ES	Reg. II Private	Visayas ES	Reg. VI Private	Davao NCC	Tupi ES	Reg. XI Private
Medium Truck	2	–	2	–	1	1	–
Small Truck	–	–	2	–	1	1	–
Pick-up Truck	2	–	2	–	1	1	–

5.5 Other Support Equipment

To strengthen the seed production systems in the government and private sector, the improved distribution plan for supporting equipment is required and provided because of the reasons shown below. The equipment and basic conditions are as follows.

(1) Excavator

1) Ilagan ES

The station is located at the river side table land and the land is often flooded during rainy season. The flooded water is not quickly drained because of poor drainage systems, and gives damages to the crops. To rehabilitate the drainage systems about 70 horse power machines are provided.

2) Visayas ES

The irrigation and drainage canals were provided well in this farm, but the drainage canals are already superannuated and required rehabilitation. And the farm is supplied water from the lagoon located beside the farm during dry season, but it is stagnated with the sludge on the bottom, and is decreasing the water holding capacity. It requires the equipment to dredge the sludge during dry season, then the similar machine with Ilagan ES but the swamp type is provided.

3) Davao NCC

The farms in this NCC are buried alot of rocks which disturb the mechanized farming. The same type of machine with Ilagan ES is provided to remove these rocks and to rehabilitate the street drain.

(2) Forklift

Each farm of government sector will be provided the improved warehouse to store a lot of quantity of buffer stock seeds. So far the warehouse has no mechanical handling method, but the seeds intended to store as buffer stocks will give cruel works for the labours to handle. The forklift with about 1.5 ton lifting capacity is provided to each farm including Tupi SF.

(3) Workshop Tools

Although the level of technique for machinery maintenance in each farms of government sector, the maintenance of machinery is not kept sufficiently due to lack or superannuation of machinery and tools for repairing. The superannuation of the machinery therefore is not avoided. Since the additional machinery will be

distributed, one set of the repairing machinery and tools such as a set of mechanic tools, electric welder, gas welder, electric power tools, lifting tools and other workshop tools are distributed to Ilagan ES, Visayas ES and Davao NCC.

(4) Improved Prefabricated Warehouse

Total of quantity of buffer certified seeds will be 286 tons at wet season and 355 tons at dry season. This is not accommodated in the warehouse of Visayas ES, and it is not economical to gather to the station. Therefore, one set each of prefabricated warehouses is distributed to 4 provinces except Iloilo province in Region VI to store the buffer stock of rice certified seeds. On the other hand the private seed producer in Maddela in Region II has to provide buffer stock of peanuts seeds stored in Ilagan ES after drying. To support this private seed producer the same type of warehouse with Region VI is provided in Maddela.

Since the private seed producer for 3 objective crops will be distributed some post harvest machinery, these warehouses can be utilized to accommodate these machinery. Therefore, the warehouse shall have somewhat surplus space, which will be about 700 m^3 holding capacity.

To consolidate above distribution the plan is provided as follows.

Class	Ilagan ES	Reg. II Private	Visayas ES	Reg. VI Private	Davao NCC	Tupi ES	Reg. XI Private
Excavator	1	–	1	–	1	–	–
Forklift	1	–	1	–	1	1	–
Workshop Tools	1	–	1	–	1	–	–
Warehouse	–	1	–	4	–	–	–

5.6 Operation and Maintenance Cost

The operation and maintenance cost for the machinery consists of fixed cost and variable cost, and fixed cost is estimated by the multiplication of initial cost and fixed cost coefficient based on the consideration of depreciation, repair, capital interest and so on. On the other hand the variable cost is estimated based on the fuel cost and lubricant cost (30% of fuel cost) for engine driven machine, and the electricity cost. The labor cost for the machinery is not considered in the estimation, because all the labor is of the staff of government sector employees; they are not only working for the machinery but also the other assignment.

The bases of estimation for the operation and maintenance cost are as follows:

Farm Machinery

1. 60 PS and 35 PS of Tractor
   - Fixed cost ratio : 24.6%
   - Fuel consumption : 220 g/PS.hr Diesel
   - Working time : 720 hrs/year (8 hrs x 90 days)
2. 15 PS of Tractor
   - Fixed cost ratio : 24.6%
   - Fuel consumption : 250 g/PS.hr Diesel
   - Working time : 720 hrs/year (8 hrs x 90 days)
3. 7 PS of Hard Tractor
   - Fixed cost ratio : 24.6%
   - Fuel consumption : 250 g/PS.hr Diesel
   - Working time : 540 hrs/year (6 hrs x 90 days)
4. Implement for tractors
   - Fixed cost ratio : 32.0%

Post harvest Machinery

1. Thresher, Corn-sheller, Seed-separator with 7 to 12 PS engine
   - Fixed cost ratio : 25.0%
   - Fuel consumption : 250 g/PS.hr
   - Working time : 320 hrs/year (8 hrs x 40 days)
2. Processing Plant
   - Fixed cost ratio : 23.0%
   - Working time : 400 hrs/year (8 hrs x 50 days)
3. Dryer
   - Fixed cost ratio : 25.0%
   - Fuel consumption : 6 lit/ton Diesel (for Region VI)
   - Working time : 450 hrs/year (10 hrs x 45 days)

Transportation

1. 6 ton Truck
   - Fixed cost ratio : 30.1%
   - Fuel consumption : 0.2 lit/km Diesel
   - Running distance : 100,000 km/year
2. 2 ton Truck
   - Fixed cost ratio : 30.1%
   - Fuel consumption : 0.18 lit/km Diesel
   - Running distance : 100,000 km/year
3. Pick-up Truck
   - Fixed cost ratio : 30.1%
   - Fuel consumption : 0.13 lit/km Diesel
   - Running distance : 50,000 km/year

Storage

1. Air-conditioned Storage
   - Fixed cost ratio : 21.5%
   - Working time : 4,380 hrs ·24 hrs x 365 days x 50%)

Heavy Equipment

1. Excavator
   Fixed cost ratio : 35%
   Fuel Consumption : 200 g/PS.hr Diesel
   Working time : 750 hrs/year (5 hrs x 150 days)
2. Fork-lift
   Fixed cost ratio : 35%
   Fuel Consumption : 200 g/PS.hr Diesel
   Working time : 750 hrs/year (5 hrs x 150 days)

Fuel cost: : ¥4.96/lit

Electricity cost : ¥2.50/KWH
(ignored the demand charge)

Consolidated estimation of the operation and maintenance cost is shown in Table F.5.2 and the summary below.

Class	Ilagan *ES*	Reg. II *Private*	Visayas *ES*	Reg. VI *Private*	Davao *NCC*	Tupi *ES*	Reg. XI *Private*
Operation and maintenance cost	P4.347M	P0.972M	P8.314M	P2.103M	P3.053M	P1.836M	P0.544M

Table F.1.1 1978 - 1989 ANNUAL INDUSTRIAL SALES

	YEAR												
Machineries	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Total
Four-Wheel Tractor	1,266	1,224	667	728	653	525	237	89	53	48	149	166	5,805
Standard	971	836	482	566	522	382	122	50	46	25	103	85	4,190
Compact	295	388	185	162	131	143	115	39	7	23	46	81	1,615
Farm Engines	40,526	47,388	33,312	35,731	28,247	24,900	7,367	9,441	10,230	17,802	19,715	39,184	313,843
Gasolene	34,559	41,471	26,666	26,203	20,552	18,973	4,997	6,794	7,660	14,538	16,184	32,799	251,396
Diesel	5,967	5,917	6,646	9,528	7,695	5,927	2,370	2,647	2,570	3,264	3,531	6,385	62,447
Power Tiller	7,803	5,379	2,993	2,901	2,157	1,635	1,233	855	300	185	883	1,129	27,453
Post-Harvest Equipm	3,169	3,914	3,652	2,957	908	806	1,011	1,084	617	507	510	375	19,510
Rice Mill	418	644	171	1,568	402	180	245	261	284	286	190	275	4,924
Thresher	2,220	3,006	2,401	1,137	391	334	487	586	247	142	245	9	11,205
Sheller	43	9	8	7	27	118	88	109		-	7	21	437
Rice Huller	174	118	956	168	49	36	22	48	9	39	3	13	1,635
Blower	-	-	-	-	-	26	6	-	-	-	32	56	120
Reaper	-	-	-	-	-	96	142	80	34	40	33	1	426
Dryer	163	73	58	17	32	12	21	-	43	-	-	-	419
Grinder	36	32	14	8	-	4	-	-	-	-	-	-	94
Feed /Hammermill	115	32	44	52	7	-	-	-	-	-	-	-	250
Irrigation Pump	4,331	4,106	2,155	1,753	1,586	1,234	625	129					15,919
Grand Total	57,095	62,011	42,779	44,070	33,551	29,100	10,473	11,598	11,200	18,542	21,257	40,854	382,530

A.M.D.A.

Table F.1.2 STATIONS INVENTORY OF MACHINERY AND EQUIPMENT UNDER ESDP INITIAL STAGE (1975)

Regio	Experiment Stations/ Seed Farms	Pre-harvest Facilities							Post-harvest Facilities							Transportation Facilities			
		Tractor			Grass Cutter	Sprayer	Pump	Grass Cutter	Pre-harvest Sub-total	Seed Plant (t/hr)	Dryer Seed	Seed Separator	Power Thresher	Corn Sheller	Cold Storage	Post-harvest Sub-total	Jeep Sub-total	Cargo Truck	Dump Truck	Transportation Sub-total
		> 50	> 30	> 10															
CAR	Buguias NCC																		
	Luna Seed Farm		2	1	1	1	2		7		2	2	1	1		6	1			1
I	Dingras Expt. Station		1	1					2								1			1
II	Agricultural Pilot Center																			
	Ilagan Expt. Station		1	1					2		1	1	1	1		4	1			1
	Cagayan Valley Expt. Station			1	1	1	1		4	1	2		1			4	1			1
	Abulug Seed Farm																			
III	Phil. Rice Central Expt. Station		1	1	1		4		7		1				1	2	2	1		3
NCR	BPI Central Office Manila																7			7
	Quezon City Central Nursery																		1	1
IV	Economic Garden NCC			1	1				2		1			1		2	1			1
	Dr. M. L. Roxas Memorial Expt. Station		1			1			2		1	1		1		3				
	Tiaong Expt. Station																			
	Mindoro Horticultural Center																			
	Tanay Seed Farm																			
	Palawan Seed Farm																			
V	Bicol Expt. Station		1	2		1	2		6			1		1		2	1		1	2
	Albay Expt. Station																			
	Daet Seed Farm																			
	Virac Seed Farm																			
VI	La Granja NCC		1	1		1	2		5		1	1		1		3				
	Visayas Expt. Station		2	1	1	1	1		6	1	1				1	3	2	1		3
	Iloilo Seed Farm																			
	Guimaras Seed Farm																			
VII	Mandaue Expt. Staion																			
	Bohol Expt. Station		1		1		2		4								1			1
	Agricultural Productivity Center																			
VIII	Romualdez Expt. Station		1				1		2		1			1		2	2			2
	Abuyog Expt. Station			1					1											
	Gandara Seed Farm		1	1			1		3											
	Ssicedo Seed Farm																			
IX	Ipil Expt. Station			1			1		2		1		1			2	1			1
X	Dalwangan Expt. Station																			
	Bukidnon Seed Farm																			
XI	Davao NCC		1	1	1		1		4		1	1		1		3				
	Tupi Expt. Station		1						1		1		1			2				
XII	Mindanao Expt. Station		1	1	1	1			4	1	1	1	1		1	5	2	1		3
	Aroman Seed Farm																			
	Kidapawan Seed Farm		1			1	2		4		1	1	1			3	1			1
	Amas Seed Farm																			
	Total		17	15	8	8	20	0	68	3	16	9	7	8	3	46	24	3	2	29

Table F.1.3 STATIONS INVENTORY OF MACHINERY AND EQUIPMENT UNDER ESDP SUPPLEMENTARY STAGE (1980)

Regio	Experiment Stations/ Seed Farms	Pre-harvest Facilities								Post-harvest Facilities							Transportation Facilities			
		Tractor		Trailer	Grass Cutter	Power Sprayer	Manual Sprayer	Power Tiller	Pre-harvest Sub-total	Seed Plant (t/hr)	Seed Dryer	Rice Seeder	Coating Machin	Corn Sheller	Cold Storage	Post-harvest Sub-total	Jeep	Cargo Truck	Dump Truck	Transportation Sub-total
		> 50	> 30																	
CAR	Buguias NCC																			
	Luna Seed Farm	2				2	7	2	13		2					2	1	2		3
I	Dingras Expt. Station																			
II	Agricultural Pilot Center																			
	Ilagan Expt. Station	1				1	2	1	5	1 (0.6.)						1	1	1		2
	Cagayan Valley Expt. Station		1		2	1	2	2	8								2	1		3
	Abulug Seed Farm									1 (1..)						1				
III	Phil. Rice Central Expt. Station		2	4	3	1	4	4	18		4	1	1			6	2	1		3
NCR	BPI Central Office Manila																7	2		9
	Quezon City Central Nursery																			
IV	Economic Garden NCC																	1		1
	Dr. M. L. Roxas Memorial Expt. Station																			
	Tiaong Expt. Station																			
	Mindoro Horticultural Center				2	1	2	3	8	1 (0.4.)	1					2		1		1
	Tanay Seed Farm																			
	Palawan Seed Farm																			
V	Bicol Expt. Station		1		2	1	3	3	10	1 (0.6.)	3					4	2	1		3
	Albay Expt. Station																			
	Daet Seed Farm		1	1	1	1	2	1	7	1 (0.4.)						1	1	1		2
	Virac Seed Farm																			
VI	La Granja NCC	1			2		3		6	1 (0.6.)						1	1	1		2
	Visayas Expt. Station		1		1		3	2	7								2	1		3
	Iloilo Seed Farm																			
	Guimaras Seed Farm																			
VII	Mandaue Expt. Staion																			
	Bohol Expt. Station	2			1	1	1		5	1 (0.6.)						1	2	1		3
	Agricultural Productivity Center																			
VIII	Romualdez Expt. Station		1		1	1	1	1	5	1 (0.6.)						1	2	1		3
	Abuyog Expt. Station																			
	Gandara Seed Farm	1			1	1	2	2	7	1 (0.4.)						1	1	1		2
	Salcedo Seed Farm																			
IX	Ipil Expt. Station	1			1	1	2	1	6	1 (0.6.)						1	2	1		3
X	Dalwangan Expt. Station	1			2	1	3		7	1 (0.6.)						1	2	1		3
	Bukidnon Seed Farm																			
XI	Davao NCC		1		2	1	2		6	1 (0.6.)						1	2	1		3
	Tupi Expt. Station		1		1	1	2	1	6	1 (0.6.)						1	1	1		2
XII	Mindanao Expt. Station			5	2	1	4	5	17								2	1		3
	Aroman Seed Farm																			
	Kidapawan Seed Farm																			
	Amas Seed Farm	2			1	1	2		6	1 (0.6.)						1	1	1		2
	Total	11	9	10	25	17	47	28	147	14	10	1	1			26	34	22		56

Table F.1.4 INSTITUTE INVENTORY OF MACHINERY AND EQUIPMENT UNDER KRII

Institute	1978 Grant			
	Tractor (B-6000 DR)	Engine Driven Power Sprayer	Mist Blower	Knapsack Sprayer
1 BPI, Region I			3	2
2 BPI, Region II			3	2
3 BPI, Region III			3	2
4 BPI, Region IV			3	2
5 BPI, Region V			3	2
6 BPI, Region VI			3	2
7 BPI, Region VII			3	2
8 BPI, Region VIII			3	2
9 BPI, Region IX			3	2
10 BPI, Region X			3	2
11 BPI, Region XI			3	2
12 BPI, Region XII			3	2
13 BPI, Central Office			2	1
14 Claveria Vegetable Farm	4			
15 Amas Seed Farm	4	1		
16 Aroman Seed Farm	4	1		
17 Kibawe Seed Farm	3			
18 Kidapawan Seed Farm	1	1		
19 Midsayap Rice Exp. Station	1	1		
20 Tupi Seed Farm	1	1		
21 Manambulan Seed Farm	4	1		
22 Ipil Experiment Station	2			
23 Marcos Corn Exp. Station	4			
24 Eastern Visayas Exp. Station	3			
25 Daet Seed Farm	2			
26 Ilagan Experiment Station	4			
27 Luna Seed Farm	3			
28 Mindoro Horticulture Center	3			
29 Tanay Vegetable Farm	3			
30 Palawan Seed Farm	2			
31 Gandara Seed Farm	3			
32 Dr. Manuel Roxas Exp. Sta.	3			
33 Tiaong Experiment Station	3			
34 Bantay Cotton Research Cente	2			
35 Albay Experiment Station	3			
36 Dingras Experiment Station	2			
37 Baguio Experiment Station	1			
38 Novaliches Seed Farm	4			
39 Paoay Lake Dev. Project	1			
40 Abuyog Experiment Station	2			
41 Economic Garden	3			
42 Visayas Rice Exp. Sta.	2			
43 Bicol Rice Central Exp. Sta.	2			
44 Sta. Barbara Exp. Station	1			
45 La Granja Exp. Station	2			
Total	82	6	38	25
No. of Sites.	32	6	13	13

Note : By 1979 2-KR Grant, 15 units of Power Sprayer, 4 units of 2 raws Harvester and 4 units of 1 row Harvester are supplied to BPI Central Office.

Table F.1.5 STATIONS INVENTORY OF MACHINERY AND EQUIPMENT BASED ON THE QUESTIONNAIRE SURVEY

Pre-harvest Facilities											Post-harvest Facilities																Transportation Facilities										
Tractor > 50		Tractor> 30		Tractor> 10		Hand Tractor		Sprayer		Pre-harvest Sub-total	Seed Plant		Thresher		Dryer		Pre-cleaner		Separater		Corn Sheller		Weigher		Post-Harvest Sub-total	Jeep		Truck		Pick Up		S. Wagon		Transportation Sub-total
No.	Funct	No.	Funct	No.	Funct	No.	Funct	No.	Funct		No.	Funct	No.	Funct	No.	Funct	No.	Funct	No.	Funct	No.	Funct	No.	Funct		No.	Funct	No.	Funct	No.	Funct	No.	Funct	
1	1	3	0	3	3	1	0			8			1	1									1	1	2	7	7	1	0	3	3	1	1	12
										0															0									0
6	2									6															0	3	3							3
7	5					16	10	1	0	24			7	4	4	2			4	4			5	2	20	2	0	1	0						3
1	1	3	1	12	6	2	2	2	2	20	1	1	1	0	1	0			1	1	1	0			5	1	1	1	1						2
1	0	1	0	1	0			3	1	6															0	2	2	1	0						3
		15	4			2	0			17			1	0	5	5	1	1	2	2			1	1	10	3	3								3
				2	0	8	8			10			2	2											2			2	2						2
										0			2	2	6	6	1	1	3	2			2	2	14									0
						8	1	9	9	17															0									0
		1	0							1			1	1	1	1					1	1			3	3	3	1	1	1	1			5
1	1	1	0	9	0					11					1	0	1	1			1	1			3	3	3			3	3			6
		1	1							1			1	1					1	1			1	1	3	11	10	4	3	4	4	3	3	22
										0															0									0
										0															0									0
										0															0									0
1	1			9	6	2	0			12	1	1			3	2	1	1	1				1	1	7									0
		1	0	3	0					4															0									0
1	0	2	2	3	1	2	2	3	3	11	1	1			3	1	1	1	2	2	9	7	1	1	17			1	0					1
		1	1					2	1	3			3	3											3	1	0							1
1	0					1	1			2	1	1			2	2	1	1	2	2			2	2	8	1	1	1	1					2
		3	1	8	5	2	0			13	1	1	2	1	3	3	1	1	2	2			3	2	12	2	2	2	2					4
		3	0							3									1	1					1	1	1							1
										0															0									0
										0															0									0
		3	3							3					2	0	1	1	1	1			2	2	6	3	3							3
2	2	6	6	1	1	3	3			12			1	1	2	2			1	1					4	19	19							19
1	1			6	6					7	1	1													1	3	1	1	1					4
				3	3			11	9	14													1	1	1	1	1			1	1			2
1	0	1	1	8	5	3	2			13	1	1													1	2	2							2
										0															0									0
				1	1	1	0			2			1	0	1	1			1	0			2	1	5			1	0					1
										0															0									0
				1	1			1	1	2			2	2	1	1							1	1	4	1	1			1	1			2
1	0	1	1	7	6			3	2	12			1	1	1	0			1	1					3	2	2	2	2	4	4	1	1	9
		1	0	2	2			3	3	6			2	1	1	0	1	1	2	2			1	1	7	2	2	1	1					3
										0															0									0
				8	3					8													1	1	1	2	1							2
		1	0	4	2					5															0	2	0							2
										0															0									0
25	14	48	21	91	51	51	29	38	31	253	7	7	0	28	20	37	26	9	9	25	23	12	9	25	20	143	77	68	20	14	17	17	5	5	119

Table F.1.6 SEED GROWERS INVENTORY OF MACHINERY AND STORAGE FACILITIES BASED ON QUESTIONNAISE SURVEY

		Number of Reportings				Unit Number			
		II	VI	XI	Total	II	VI	XI	Total
A.	Machineries								
	1. Tractor								
	- 4 wheel	6	2	-	8	8	3	-	11
	- 2 wheel	21	4	3	28	47	8	6	61
	2. Grain Dryer	2	-	-	2	3	-	-	3
	3. Thresher	11	5	2	18	17	10	2	29
	4. Sprayer	22	5	6	33	66	25	20	111
	5. Pump	10	5	3	18	19	11	6	36
B.	Seed Storage Facilities								
	1. Warehouse	14	3	7	24	9	3	4	16
	2. Seed Conditioning Room	1	1	-	2	1	1	-	2
	3. Bodega	4	1	1	6	4	1	1	6
	Total	91	26	22	139	174	62	39	275

Table F.1.7 SEED PROCESSING AND STORAGE RECORD IN PHIL RICE CENTRAL STATION

Year	Crop	Sources	No. of Cavans			
			Cleaned	Threshed/Shelled	Dried	Storage
1972-1973	Rice	Government	3,044 (152 tons)	423 (21 tons)	-	-
		Private persons	3,433 (172 tons)	4,433 (72 tons)	-	-
	Tomato	Private	11.2 kgs	-	-	-
	Sub - total		6,477 & 11.2 kgs	4,856		
1973-1974	Rice	Government	3,132 (157 tons)	-	1,748 (87 tons)	2,694
		Private	3,399 (170 tons)	-	6,471 (324 tons)	-
	Corn	Government	574 (39 tons)	12 (0.6 tons)	29 (1.5 tons)	-
		Private	237 (12 tons)	-	370 (18.5 tons)	-
	Sorghum	Government	-	13 (0.65 ton)	-	-
	Soybean	Private	-	2	-	-
	Vegetable	Cowpea	-	-	2	-
	Legume	Sugar pea	22	-	-	-
		Bush Sitao	20	-	-	-

Table F.4.1 PRESENT SITUATION OF MACHINERY & EQUIPMENT USED BY SEED GROWERS

	Respondents	Share to Total
1. Irrigation Equipment		
Irrigation pump w/	22	52.38%
Gravity Irrigation	5	11.90%
No answer	15	35.71%
Total	42	100.00%
2. Farm Machinery		
Animal power equi	9	21.43%
2 Wheel power till	20	47.62%
& Wheeless power tiller		
4 Wheel tractor	6	14.29%
Manpower equipm	2	4.76%
No answer	5	11.90%
Total	42	100.00%
3. Seed Post-Harvest Machinery		
Winnower w/ prim	11	26.19%
Manual winnower	2	4.76%
Box Dryer	1	2.38%
Power thresher	13	30.95%
Manual (Pedal) thr	1	2.38%
& Manual winnower		
Peanut sheller	3	7.14%
No answer	7	16.67%
Others	4	9.52%
Total	42	100.00%
4. Transportation		
Stake truck	3	7.14%
Jeepney	9	21.43%
Animal drawn cart	12	28.57%
Others	3	7.14%
Tricycle	4	9.52%
No answer	11	26.19%
Total	42	100.00%

Table F.4.2 OPERATION OF DRYERS (A, B, C) IN VISAYAS ES

	'86/87				'87/88				'88/89				Grand Total
	A	B	C	Total	A	B	C	Total	A	B	C	Total	
Total Sacks	1713	2249	1687	5649.0	1718	1503	1339	4560.0	1355	1195	1400	3950.0	14159.0
Average Sacks	57.1	59.2	56.2	-	59.2	60.1	58.2	-	58.9	54.3	53.8	-	-
Total Drying Time (hr)	360.5	477.0	396.0	1233.5	616.0	336.0	335.0	1287.0	281.0	282.0	336.0	899.0	3419.5
Average Drying Time	12.0	12.6	13.2	-	14.2	13.4	14.6	-	12.2	12.8	12.9	-	-
Number of Variety	4	6	4	-	7	6	6	-	6	8	7	-	-
Ave. Initial M.C.	18.8	18.6	18.8	-	20.9	20.5	20.7	-	19.9	19.2	19.8	-	-
Ave. Final M.C.	12.5	12.5	12.2	-	12.4	12.4	12.4	-	12.2	12.1	12.1	-	-

Table F.4.3 PEANUTS POST-HARVEST WORKS IN REGION II

1. Harvesting Method			
	Manual pulling	4	57.14%
	Use of plow	3	42.86%
	Total Questionnai	7	100.00%
2. Days to Separate Pods from Plants			
	Average	2.7 days	
	Range	1 - 3 days	
3. Separation Method b:		7	100%
4. Drying			
	On concrete pave:	1	14.29%
	On field	1	14.29%
	On gravel	2	28.57%
	On ground	1	14.29%
	On others (unspec	1	14.29%
	No answer	1	14.29%
	Total Questionnai	7	100.00%
5. Average Number of	13.3 days		
	Range	3 - 5 days	

Table F.4.4 LOWLAND RICE SEED POST-HARVEST ACTIVITIES IN REGION VI

		Respondents	Share to Total
1. Threshing			
Agad mechanical thresher & Foot treader		1	3.85%
Axial flow thresher		9	34.62%
Ecfe thresher		1	3.85%
Icking thresher		1	3.85%
Jaspe thresher		5	19.23%
Magico thresher		6	23.08%
Unspecified brand		2	7.69%
No answer		1	3.85%
Total		26	100.00%
2. Drying			
On concrete pavement		4	66.67%
On mats, canvas or nets		6	100.00%
On sawali		3	50.00%
On others e.g. screen, nets, road, unspecified		3	50.00%
On concrete pavement/mats, canvas or nets		7	116.67%
On concrete pavement/sawali		3	50.00%
Total		26	433.33%
3. Means of Checking Moisture Content			
By experience		13	59.09%
With moisture meter		8	36.36%
By experience & moisture meter		5	22.73%
Total		26	118.18%
4. Weather Condition at Harvest			
Wet season: Fair/Favorable/Sunny/Good		10	200.00%
Rainy/Bad/Cloudy		15	300.00%
No answer		1	20.00%
Total		26	520.00%
Dry season: Fair/Favorable/Sunny/Good/Hot		25	96.15%
No answer		1	3.85%
Total		26	100.00%
5. Average number of days to dry	2.16 days		
Range	1-3 days		
6. Cleaning			
Mechanized winnower		22	84.62%
Mechanized & manual winnower		3	11.54%
Mechanized winnower & bilao		1	3.85%
Total		26	100.00%
7. Sorting			
Yes		5	19.23%
No		12	46.15%
No answer		9	34.62%
Total		26	100.00%
8. Tool used for sorting			
Uniflow machine		1	3.85%
Coconut midrib		2	7.69%
No answer		23	88.46%
Total		26	100.00%
9. Use of Bodega/Warehouse			
General use		14	53.85%
Exclusive use for seed storage		10	38.46%
General use/Exclusive use for seed storage		1	3.85%
No answer		1	3.85%
Total		26	100.00%
10. Average seed storage duration			
1st crop	2.7 months		
2nd crop	3.3 months		
11. Average seed storage capacity	1,299 cavans		

Table F.4.5 CORN POST-HARVEST IN REGION XI

1. Harvesting Method			
Hard picking		14	93.33%
No answer		1	6.67%
Total Questionnaires		15	100.00%
2. Husking			
Manual method		13	86.67%
No answer		2	13.33%
Total Questionnaires		15	100.00%
3. Shelling			
Manual shelling		7	46.67%
Manual/wooden sheller		1	6.67%
Use of power driven shel		5	33.33%
No answer		2	13.33%
Total Questionnaires		15	100.00%
4. Drying			
Use of concrete pavemer		13	86.67%
Use of canvas		1	6.67%
No answer		1	6.67%
Total Questionnaires		15	100.00%
5. Checking of Moisture Content			
By experience		5	33.33%
W/ moisture meter		8	53.33%
No answer		2	13.33%
Total Questionnaires		15	100.00%
6. No. of Days to Dry	Average	3.09 days	
	Range	2 - 6 days	
7. Vol. of Seed Dried	Only 3 questionnaires w/ answers Average: 9.7 tons of rice Range: 4 - 19 tons		

Table F.5.1 BASIC IMPROVEMENT PLANT

Price Unit: Pesos

Item	Ilagan	Madelan	Visayas ES	R VI Support	Davao NCC	Tupi S.P.	R XI Support
1. Cultivating Area (ha.)	55.2	215	44	-	21.35	24.75	-
2. Max. Processing (t)	31.7	193.5	235.4	164.0	46.9	83	-
3. Max. Drying (t)	10.2	215	234.2	117.0	24.7	29.3	-
4. Max. Storage (t)	56.3	(21.5 in Ilagan)	255.7	164.0	49.8	88.1	-
A. C. Storage I for Dry Season	4.5	-	8.1	-	1.6	1.1	-
A. C. Storage II for Dry Season	4.8	-	-	-	-	-	-
A. C. Storage I for Wet Season	3.5	-	20.3	-	5.1	5.1	-
A. C. Storage II for Wet Season	21.5	-	-	-	-	-	-
Storage in Natural Condition for Dry Season	22	-	227.3	164.0	45.3	81.9	-
Storage in Natural Condition for Wet Season	6.7	-	(213.9.)	(117..)	(21.8.)	(24.2.)	-
5. Farm Machinery							
Tractor I	60PS x 2	-	35PS x 2		60PS x 1	60PS x 1	
Tractor II	15PS x 2	-					
Hand Tractor	7PS x 2	-	7PS x 2		7PS x 2	7PS x 2	
Implement I	Disc Plow x 2	-	Disc Plow x 2		Disc Plow x 2	Disc Plow x 2	
Implement II	Scraper x 2	-	Scraper x 2		Disc Harrow x 2	Disc Harrow x 2	
Implement III	Disc Harrow x 2	-	Trailer x 4		Trailer x 4	Trailer x 4	
Implement IV	Trailer x 4	-	Rotary x 2		Sprayer x 10	Sprayer x 10	
Implement V	Rotary x 2	-	Sprayer x 10		Corn Seeder	Corn Seeder	
Implement VI	*Sprayer x 10*	-	*Power Weeder x 5*				
Price	2,998,400	-	1,852,800		1,278,400	1,278,400	
6. Harvesting Equipment							
Thresher	400kg/hr x 2	400kg/hr x 2	1,000kg/hr x 2	1,000kg/hr x 4			
Corn Sheller					1,000kg/hr x 2	1,000kg/hr x 2	1,000kg/hr x 2
Dryer	3 ton x 1	10 ton x 1	2.8 ton x 2	2.8 ton x 4	1.0 ton x 1	1.0 ton x 1	
Seed Separator				0.5 ton/hr x 4			0.5 ton/hr x 4
Processing Plant	0.5 ton x 1	1.0 ton x 1	1.0 ton x 2		1.0 ton x 1		
Price	2,080,000	3,920,000	20,576,000	3,072,000	9,760,000	880,000	2,000,000
7. Transportation							
Truck I	6 ton x 2		6 ton x 2		6 ton x 1	6 ton x 1	
Truck II			2 ton x 2		2 ton x 1	2 ton x 1	
Pick-up	1 ton x 2		1 ton x 2		1 ton x 1	1 ton x 1	
Price	2,144,000		3,104,000		1,552,000	1,552,000	
8. Storage							
A.C. Storage I							
Condition	15°C - 40%		18°C - 60%		18°C - 60%	18°C - 60%	
Capacity	3x5x3 (45cm3) x 2		3x4x3 (36m3)x3		2.5x3x3(22.5m3)	2.5x3x3(22.5m3)	
Power Requirement	26 kw		9kw		3kw	3kw	
Price	1,120,000		1,040,000		440,000	440,000	
A.C. Storage II							
Condition	18°C - 60%						
Capacity	3x5x(3+14)(255m3)						
Power Requirement	22kw						
Price	2,080,000						
Improved Prefabricated Warehous	-	1	-	4	-	-	
		1,600,000		6,400,000			-
9. Heavy Equipment	Excavator (0.4m3) Forklift (1.5 ton)		Excavator (0.4m3) Forklift (1.5 ton)		Excavator (0.4m3) Forklift (1.5 ton)	Forklift (1.5 ton)	
Price	2,720,000		3,200,000		2,720,000	480,000	
10. Work Shop							
Price	240,000		240,000		240,000	240,000	
11. Sub-total	*13,382,400*	*5,520,000*	*30,012,800*	*9,472,000*	*15,990,400*	*4,870,400*	*2,000,000*
12. Grand Total							81,248,000

Table F.5.2 OPERATION COST

Cost Unit ; Thousand Pesos

	Ilagan	Madela	VES	Private VI	Davao	Tupi	Private XI
1.Farm Machinary							
(1) Tractor I							
(F.C. 24.6%,Diesel 220g/PS.h,) Cost P0.736M.							
(L.S. 8years,720hrs/year operation) Cost P0.48M.							
Fixed Cost	362.08	-	236.16	-	181.12	181.12	-
Variable Cost	173.92	-	101.44	-	87.04	87.04	-
(2) TRactor II							
(F.C. 24.6%,Diesel 220g/PS.h,) Cost P0.197M.							
(L.S. 8years,720hrs/year operation)							
Fixed Cost	96.80	-	-	-	-	-	-
Variable Cost	43.52	-	-	-	-	-	-
(3) Hand Tractor							
(F.C. 24.6%,Diesel 250g/PS.h,) Cost P0.096M.							
(L.S. 5years,540hrs/year operation)							
Fixed Cost	70.88	-	47.20	-	47.20	47.20	-
Variable Cost	25.92	-	17.28	-	17.28	17.28	-
(4) Implement (F.C. 32.0%)	(5.480.)		(4.38.)		(3.69.)	(3.69.)	
Fixed Cost	280.64		224.32		188.96	188.96	
2. Postharvest Machinary							
(1) Thresher							
(F.C. 25%,Diesel 250g/PS.h,)							
(L.S. 5years,320hrs/year)							
Fixed Cost	40.00	100.00	24.00	48.00	-	-	-
Variable Cost	7.20	18.72	21.92	43.84	-	-	-
(2) Corn Sheller							
(F.C. 25%, Diesel 250g/PS.h,)							
(L.S. 5 years, 320hrs/year)							
Fixed Cost	-	-	-	-	40.00	20.00	100.00
Variable Cost	-	-	-	-	10.24	5.12	25.60
(3) Seed Separator							
(F.C. 25%,Diesel 250g/PS.h,)							
(L.S. 5years,320hrs/year)							
Fixed Cost	-	-	-	-	320.00	-	400.00
Variable Cost	-	-	-	-	14.72	-	18.24
(4) Processing Plant							
(F.C. 23%,15 kwH,12kwH)							
(L.S. 8years,400hr/year)							
(Power Consumption)	15kw	15kw	12kw		6kw		
Fixed Cost	257.60	515.20	4,158.40	-	202.40	-	-
Variable Cost	15.04	15.04	12.00	-	6.08	-	-
(5) Dryer (F.C. 25%, 6 LPT, 450hr)							
(Power Consumption)	(1.9kw)	(1.9kw)	(20.0kw)	(8.8kw)	(1.9kw)	(1.9kw)	
Fixed Cost	200.00	320.00	600.00	2,000.00	200.00	200.00	-
Variable Cost	3.20	3.20	28.80	11.20	3.20	3.20	-
3. Transport Equipment							
(1)Truck I 150PS.							
(F.C. 30.1%,Diesel 0.2L/km,) Cost P0.800M.							
(L.S. 5years,100,000km/year)							
Fixed Cost	481.60	-	481.60	-	240.80	240.80	-
Variable Cost	292.80	-	292.80	-	146.40	146.40	-
(2) Truck II 90PS.							
(F.C. 30.1%,Diesel 0.18L/km,) Cost P0.480M.							
(L.S. 5years,100,000km/year)							
Fixed Cost	-	-	288.96	-	144.48	144.48	-
Variable Cost	-	-	263.52	-	131.84	131.84	-
(3) Pick up 80PS.							
(F.C. 30.1%,Diesel 0.13L/km,) Cost P0.208M.							
(L.S. 5years,50,000km/year)							
Fixed Cost	-	-	163.68	-	81.92	81.92	-
Variable Cost	-	-	95.20	-	47.52	47.52	-
4. Storage (F.C.21.5%, 4380hr)							
(1) A.C.I	20kw		9kw		3kw	3kw	
Fixed Cost	240.80	-	223.68	-	94.56	94.56	-
Variable Cost	219.04	-	98.56	-	32.80	32.80	-
(2) A.C.II	25kw						
Fixed Cost	447.20	-	-	-	-	-	-
Variable Cost	273.92	-	-	-	-	-	-
5. Heavy Equipment							
(1) Excavator 70PS							
(F.C. 35%,Diesel 200g/PS.h,) Cost P0.224M.							
(750hr/year)							
Fixed Cost	560.00	-	680.00	-	560.00	-	-
Variable Cost	89.28	-	89.28	-	89.28	-	-
(2) Fork lift 33PS							
(F.C. 35%,Diesel 200g/PS.h,) Cost P0.224M.							
(750hr/year)							
Fixed Cost	120.00	-	120.00	-	120.00	120.00	-
Variable Cost	45.28	-	45.28	-	45.28	45.28	-
Total	4,346.72	972.16	8,314.08	2,103.04	3,053.12	1,835.52	543.84

Annex G

Seed Related Buildings

FEASIBILITY STUDY ON
IMPROVEMENT OF SEED PRODUCTION AND DISTRIBUTION, AND
ESTABLISHMENT OF
APPROPRIATE SEED STORAGE SYSTEM

ANNEX G SEED RELATED BUILDINGS

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1. OUTLINE OF THE STUDY

1.1 Objectives

Dealing with the increased Production Program of Seed, this study aims to review existing buildings of seed testing laboratory, seed processing plant and seed storage in the Experiment Stations and Seed Farms, and to propose improvement plan to strengthen their functions.

1.2 Current Situation

1.2.1 Present Activities

At present forty (40) seed production and research organizations, which are generally called as the Experiment Station and Seed Farm, are under operation in the Philippines. Of them, seventeen (17) are Experiment Stations, fourteen (14) Seed Farms, four (4) National Crop Centers ; and moreover Agricultural Pilot Center, BPI Central Office, Quezon City Control Nursery, Mindoro Horticultural Center and Agricultural Productivity Center are existing. The names are different, but the contents of the works are almost the same. Therefore the organizations, unless otherwise mentioned, will be called in this Article as "Experiment Station".

A Seed Processing Plant and a Seed Storage House are under control of every Experiment Station. Seed Processing Plants are constructed in fifteen (15) Experiment Stations and Seed Storage Houses called as Bodega are in eleven (11) Experiment Stations (Table G.1.1).

1.2.2 Different Chains of Command

Seed Testing Laboratories are constructed in fourteen (14) Experiment Stations (Table G.1.1), but are out of control of the Experiment Stations. Both Experiment Station and Seed Testing Laboratory belong to every Regional Office of the Department of Agriculture. The chain of command, however, is different. Every Experiment Station is under control of an Assistant Regional Director for Research and every Seed Testing Laboratory is of an Assistant Regional Director for Operations (and Regulatory).

1.2.3 Structures of Buildings

The existing buildings are constructed in reinforced concrete columns and girders, hollow concrete block walls laid up out of underground, and wooden trusses directly roofed

with corrugated galvanized steel sheet. As far as building structure is concerned, there is no difference between the existing buildings. Difference between buildings is appeared to doors, windows, ceilings, over-hanging eaves and designs.

- Every Seed Testing Laboratory puts up ceiling and soffit boards, installs glazed windows and doors, and partially finishes interior walls with wood-made boards.
- Every Seed Processing Plant installs galvanized steel suspended sliding doors and hollow concrete block-made louvers and opens between roof and exterior wall.
- Every Seed Storage House (Bodega) partially puts up ceiling, and installs galvanized steel suspended sliding doors and hollow concrete block-made louvers, and opens between roof and exterior wall.

2. REVIEW OF EXISTING BUILDINGS

The existing buildings was reviewed on the following two points in this study :

- Whether or not the materials, finish and specifications of a building meet the use.
- Whether or not the function of the building satisfies the requirements for the function.

If an existing building does not satisfy both requirements, the building is regarded as a thing re-constructed.

2.1 Regional Seed Testing Laboratory

Seed test requires to be performed under an even temperature and an even relative humidity. Samples after the test are required to be stocked for two years.

An existing building is designed with an ordinary ventilation system. A standard laboratory in a region consists of four testing rooms, one office room, one printing room which was designed as a storage room, a hall and lavatory (Fig. G.2.1). Area of each room is twelve square meter (12 m^2). An average of thirteen persons work in the Laboratory. In a peak season, three to five persons share a work and moreover all persons join in tagging work. The existing room installing equipment therefore is small.

It is a real state that samples to be tested for germination are arranged on the passageway and moreover dividing work to the samples is done at the outside of a Seed

Testing Laboratory. A storage room is utilized as a tag-printing and typing room. The seed remains after tests are stored in every cabinet under tables.

A Laboratory being an independent organization, electric power and water for the building should be considered separating from the Experiment Station of a land owner. Water to be used in the building should be independently secured because water used in an Experiment Station depends on underground water which often causes a water shortage in the dry season. It is necessary to install a generator not to spoil samples under germination test by germinators because of a power failure occurs often.

The Laboratory is inappropriate to show the function and small to achieve its purpose. The Laboratory therefore will be examined on condition of renewing it in this Article.

2.2 Seed Processing Plant

2.2.1 General

Main purposes of the Plant are to dry and select seed. A plant is required to be made clean not to mingle other varieties prior to posterior to use. Easiness of cleaning is therefore required as one of the important factors of the building.

An existing building has defects of using hygroscopic material of hollow concrete blocks and of leaving birds trespassing into a plant room. This plant is often used as temporary storage room. In the case suspended double sliding doors allow invasion of rats and mice into, and moreover, non-shut louvers constructed with hollow concrete blocks easily allow for moisture to creep into the room (Fig. G.2.2).

Judging from the grade and materials of the building, it is not practical to repair the existing Plant so as to grade up.

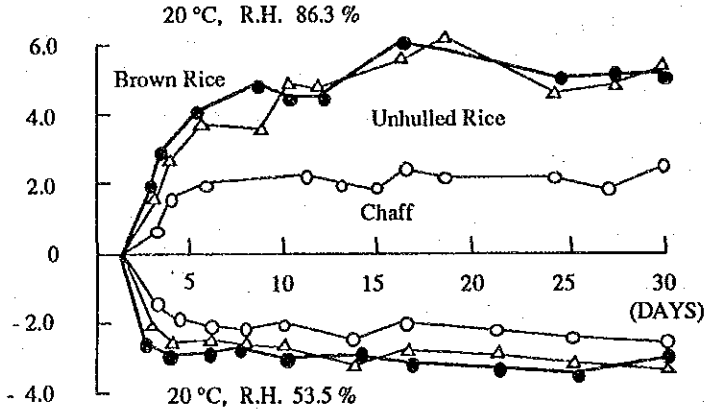
2.2.2 *Proposed Model Regions*

Every seed processing plant in the proposed pilot regions is newly planned to be installed for objective seed. Therefore, the plant for this purpose will be newly designed.

2.3 Seed Storage House

The period to the beginning of germination reduction after harvest is called as a life span of a kind of seed. The life span of seed varies with a variety of causes such as a kind of seed, a ripe degree of the seed, a district producing the seed, a degree of damage caused by

disease germs and carriers and storage condition. It is specially reported that moisture content of the seed and ambient temperature and relative humidity during the storage affect the life span of seed. Relations between moisture content and the ambient temperature or relative humidity are shown as follows :



Variation rate in rice grain weight under different relative humidity (R. H.)

Moisture Content	Storage Temperature (°C)								
	-10	-5	0	5	10	15	20	25	30
4 %	1,606	726	328	148	67	30	14	6	3
6	772	349	158	71	32	15	7	3	1
8	371	168	76	34	15	7	3	1	1
10	179	81	36	16	7	3	2	1	–
12	86	39	18	8	4	2	1	–	–
14	41	19	8	4	2	1	–	–	–
16	20	9	4	2	1	–	–	–	–
18	10	4	2	1	–	–	–	–	–

Years to 90% reduction of germination under different conditions between moisture content of rice seed and the ambient storage temperature.
(This chart is induced by Mr. Itoh on the basis of expression of E. H. Roberts)

From the charts the two matters are comprehended. One is on condition of even moisture content and the ambient temperature that while absorbing moisture in the air under high relative humidity, a grain of rice releases moisture into the air under relatively low relative humidity. The other is that even if the control of the ambient temperature is easy, the rice seed controlled moisture content can lengthen the life span.

It is recommended for the viability of seed that seed should prefer the storage-keeping on low relative humidity and natural room temperature rather than high relative humidity and low room temperature, and reported that a good storage conditions between temperature (T) and relative humidity (R.H.) are that both total value equal to and not more than 100 : R.H. % + T °F = 100. While an air-conditioned room might take installment of humidifiers into consideration by requirement for temperature, being dehumidified automatically.

While storage is a connection between processes of physical distribution, and therefore storage system is often apt to be adopted without deliberation on storage. Storage, however, is never economic idea. Agricultural storage would be hence examined on two points of view. One is the necessity of storage and the other is the condition of storage. The aim, requirements and strategic points of storage should be sufficiently studied prior to the determination of the capacity, term and varieties of the stored. A storage house or system considered on these situation would need for sound management.

An existing seed storage house, which is called as "Bodega" in the Philippines (Fig. G.2.3), has a storage capacity of 9.5 tons, 44.1 tons and 66.2 tons in every building scale A, B and C. The bodega is, however, a hygroscopic and moist structure. While the Philippines has high temperature and humidity. The mean annual temperature is about 27.1 °C and the average annual relative humidity is about 82 %, and moreover, the range of every variation of the temperature and the relative humidity is narrow. The bodega is therefore a temporary house to the next step and is inappropriate to store seed over several months.

A plan in this study is to produce to store some recommended quality seed, including certified seed, to demanded production volume in pilot regions. For this two measures are taken in the study. One is at least to store the seed over eight months under air-conditioning and the other to store the seed for several months under room temperature.

There is no data of the life span of proposed seed under high temperature and humidity. The storage under room temperature therefore will take thermal insulation and dump proof into attention.

2.4 Probable Difficulties

2.4.1 Need of Water

Need of water to be used is remarkable especially in Seed Testing Laboratories. Supply water for some of them are adjusted by the Experiment Station especially in a dry season. In the Visayas Experiment Station, both organizations, Experiment Station and

Testing Laboratory, face a serious need of water supply through the whole season. It is necessary that prompt measures should be taken to this question.

2.4.2 Suspended Budget

Most problem in proposed regions is shortage of budget, especially a suspended budget. To resolve this perplexed problem is inevitable so as to promote a development of the study.

3. OUTLINE OF PROPOSED AREA

3.1 Region II

(1) Ilagan Experiment Station

The Ilagan Experiment Station provides about five hundred square meter (500 m^2) of land for this study in the estate as shown in Fig. G.3.1.

(2) Regional Seed Testing Laboratory in San Mateo

The Laboratory provides about five hundred seventy square meter (570 m^2) of land for this study in the estate as shown in Fig. G.3.2.

3.2 Region VI

(1) Visayas Experiment Station

The Station provides about twenty thousand square meter (10,000 m^2) of land for this study in the estate as shown in Fig. G.3.3. This area includes the existing motor-pool area.

(2) Regional Seed Testing Laboratory

The Laboratory provides about eighteen hundred square meters (1,800 m^2) of land for this study in the estate as shown in Fig. G.3.3.

3.3 Region XI

(1) Davao National Crop Center (NCC)

The Station provides about twelve hundred square meters (1,200 m^2) of land for this study in the estate as shown in Fig. G.3.4. This area is abutting to the existing bodega, motor shed and workshop.

(2) Regional Seed Testing Laboratory

The Laboratory provides about one hundred sixty square meter (160 m^2) of land at the back of the Laboratory in the estate as shown in Fig.G.3.4. If area is small, the Davao NCC will provide a required area.

(3) Tupi Seed Farm

The Farm will prepare required area for a storage house near the existing bodega (Fig. G.3.5).

4. DESIGN POLICY OF PROPOSED BUILDINGS

4.1 Regional Seed Testing Laboratory

Every Laboratory manages to deal with several sorts of seed without sufficient facilities and equipment, and moreover has a limited sphere of the activities, but does not covers the whole of the region. The Laboratory therefore has no forecast for the handling volume and personnel plans at the time when this production plan would have been implemented. Accordingly, consideration would be taken into storage of post-examined seed.

- Storage room
  Although the samples after moisture and germination tests are thrown away, the remnant are stored for two years by the manual so as to re-examine the seed if an unexpected incident take place under operation of a kind of seed.

4.2 Seed Processing Plant

The Plant will be considered by the layout of a processing plant, and on a construction method of thermal insulation and easy maintenance. The floor level will be determined at the level not to be flooded by rain water.

4.3 Seed Storage House

The Storage House will be considered on thermal insulation, waterproof, dump proof, vermin, easy maintenance and the level not to be flooded by rain water. Storage capacity will be determined by stored volume, stored period and control method of seed.

5. OUTLINE OF DESIGN

5.1 Natural Condition

Consideration would be paid to the following.

5.1.1 Flood

The site of the Ilagan Experiment Station consists of a slightly gradient paddy field and terraced housing and building areas. The paddy field is located at an average 46.0 m above-sea level. During a wet season being often covered with water by the Piancanaun river, it is reported on November in 1980 that the field was inundated by floodwater, height of which was more than four meter, and that a part of housing was flooded up to the floorboards.

5.1.2 Water Supply

The Visayas Experiment Station and the Regional Seed Testing Laboratory at present face a serious problem of need of water. During a wet season the station achieves the production work in field with rain water, but there is shortage of water supply for buildings throughout the whole season. Because of this, the station has dug shallow wells, but the two of them are not yet connected with the pipe of an elevated water tank because the tank is not yet constructed. Moreover, shallow wells are reportedly not always in use during dry season due to low water level.

5.1.3 Wind Force

The Philippines is divided in three zones by wind velocity. The zone I is the area governed by 200 km per hour (KPH)(about 56 m/sec) of wind velocity, the zone II is by 175 KPH (about 49 m/sec) and the zone III is 150 KPH (about 42 m/sec). The proposed sites in Region II belong to the zone I, in Region VI belong to the zone II and in Region XI belong to the zone III. The velocity pressure (P) from 0 to 9 m height is about 196 kg/m^2 in the zone I, 147 kg/m^2 in the zone II and 98 kg/m^2 in the zone III.

5.1.4 Earthquake

The Philippines is one of the countries subject to frequent earthquake (Fig. G.5.1). The latest earthquake occurred on 16 July 1990 (Fig. G.5.2). The country in general adopts "Seismic Intensity" which is graded from I to IX. The earthquake experienced here last 16 July registered VIII on the Philippine Scale at Baguio near the epicenter and VII in Manila,

and moreover, the grounds of two coastal barangay in Sto. Tomas and one in Aringay, La Union province, reportedly sank about two meters as a result of the earthquake.

5.1.5 Uneven Settlement

Uneven settlement is found in the Visayas Experiment Station, especially in the old administration building. Designed foundation is spread foundation, and the size of underground girders is small.

The proposed area should be filled and therefore soil bearing test might be considered prior to the beginning of construction work.

5.1.6 Termite

Wooden structure should be protected from damage by white ants.

5.2 Requirements for Design

5.2.1 Specifications for Buildings

Every sort of building should take thermal insulation, waterproof, damp proof and airtight into consideration. The performance and durability should be required for the materials.

5.2.2 Required Capacity

The following should be assumed to calculate a building scale.

(1) Seed Testing Laboratory

About 1,000 kg seed are prepared for a test sample packed in a bag. Of this, nearly 500 kg of seed per bag are stored for two years. Such 5,000 bags of seed are stored in a laboratory in a year, a conditioned room would be designed as a seed storage room to store 10,000 bags of seed : A regulation room would be attached on this room to prevent heat loss and to control inventory.

(2) Seed Processing Plant

The scale of this building should be determined by the scale of a plant installed there,and moreover working space should be considered.

(3) Seed Storage House

The scale of this building should be determined by the required storage volume and control and management method of stored seed, and moreover the building should include a conditioned storage room in itself.

Storage room = requirements of stocks + control and management space for every lot or variety

Storage Method and Size of Sack

Peanut Seed :	Cluster A	Sack = 22 x 40 "	20 kg/sack
Rice Seed :	Cluster B	Sack = 22 x 40 "	45 kg/sack
Corn Seed :	Cluster B	Sack = 20 x 30 "	25 kg/sack

A cluster consists of a tier of eight sets. One set consists of a formation of four or five sacks as follows :

	Cluster A		Cluster B	
Formation of one set	 first layer	 second layer	 first layer	 second layer
Piled No. of Sets	8		8	

The cluster types should be determined on the basis of the current situation and a control methods that are based on the following ideas.

i) Samples are easily extracted from any sack of seed clusters in the storage room.

ii) Every cluster is easily taken out of the storage room in order of stock.

iii) Inventory control is easily made.

5.3 Assumed Building Scales

Required net area of every building would be calculated as follows.

5.3.1 Regional Seed Testing Laboratory

- Conditioned storage room: 10,000 bags stored for two years.

  As every dimension of a cabinet is 0.3 m deep, 4.0 m wide and 3.0 m high, a cabinet is assumed to contain 378 bags = 27 bags / shelf x 14 shelves. Therefore 27 cabinets required. Required area : 12 x 12.5 = 150.0 m^2, attaching a temperature-adjusting room of about 44 m^2 (Fig. G.5.3).

5.3.2 Seed Processing Plant

According to the existing Plant scale, a Plant scale was calculated as follows :

- Ilagan Experiment Station : 520 m^2
- Visayas Experiment Station : 660 m^2
- Davao NCC : 520 m^2

5.3.3 Seed Storage House

The scale of a Seed Storage House was calculated by the following conditions:

(1) The capacity of the House is the maximum storage volume, including a conditioned storage room. Because seed sacks are carried into a conditioned storage room after passing the examination in a Regional Seed Testing Laboratory.

(2) The successful seed ratio in the Laboratory is estimated at 80 %.

(3) The clusters of seed sacks are arranged in lines so as to extract some seed as a sample to test from any seed sack, and pathways are prepared between clusters' lines.

(4) If a length of a line is more than 10 m, a pathway is considered.

- Ilagan Experiment Station : 660 m^2
- Visayas Experiment Station : 1,370 m^2 (Fig. G.5.4)
- Davao NCC : 350 m^2

- Tupi Seed Farm : 470 m^2

6. COST ESTIMATION

6.1 Pre-condition

To compare the construction cost, the following sort of buildings was assumed. In the same sort of buildings the scales of buildings are same. As of steel structures dry construction method is presumed. Besides, thermal insulation, water proof, dump proof, airtight and durability are considered on the materials of the exterior wall, windows, doors and ceiling of a building.

Building Name \ Structure	Reinforced Concrete (R.C.)	Steel (S)
Laboratory	●	●
Processing Plant		●
Storage House	●	●

6.2 Probable Project Construction Cost

Construction cost ratio between building uses and between regionals is assumed as the following chart.

Ratio of Cost	R C			S		
	Region II	Region VI	Region XI	Region II	Region VI	Region XI
Laboratory	100	101	102	102	103	104
Processing Plant	-	-	-	101	102	103
Storage House	100	101	102	102	103	104

Construction cost consists of the following elements :

i) Management cost of contractor
ii) Direct purchased materials or rented equipment cost
iii) Direct hired labor cost
iv) Component of man power, materials and equipment to be used

v) Outside sub-contractor cost

vi) Tax and insurance

Construction cost, hence, is not invariable. Moreover, the cost is fluctuated by a scale of a building, a use of a building, a structure of a building, and materials and equipment to be used in a building. In general, however, the following are reported :

a) In the same use of a building, unit cost of a smaller building is high.
In this study most of buildings are small scale buildings which are less than 1,000 m^2

b) In local, labor cost is less expensive, on the contrary, material cost is more expensive because of adding transportation cost on them than in Manila.

c) Personal charges of a contractor and sub-contractors are increased, adding travelling expenses and allowances on the salaries.

Accordingly, unit cost was presumed referring to a rough estimate by a constructor, to construction cost of existing buildings in Manila and to a data by Japanese Grant Aid performed in the Philippines.

As a result of that, unit cost by a square-meter method is as follows :

(Unit : Thousand Pesos per square meter)

P 1 = ¥ 6.25	R C			S		
	Region II	Region VI	Region XI	Region II	Region VI	Region XI
Laboratory	38.0	38.5	39.0	39.0	39.5	40.0
Processing Plant	–	–	–	26.5	27.0	27.5
Storage House	26.0	26.5	27.0	27.0	27.5	28.0

Provide that air-conditioning cost in the seed storage room of a Laboratory is not included. The cost of that will be increased to about 3 % on the above cost.

As the result of that, the probable project construction cost of each building would be estimated as follows :

Probable Project Construction Cost (million Peso)

		Region II		Region VI	Region XI	
		Ilagan	Cagayan	Visayas	Davao	Tupi
Laboratory	RC		7.9	8.0	8.1	
	S		8.1	8.2	8.3	
Processing Plant	S	13.8		17.8	14.3	
Storage House	RC	17.2		36.3	9.5	12.7
	S	17.8		37.7	9.8	13.2

6.3 Comparison of Structures

Judging from a viewpoint of a construction cost, a steel structure which is a dry construction might generally have the advantage of a reinforced concrete structure. While, having a defect of a wet process system structure, a reinforced concrete structure might save the running cost in the aspects of longer durability and less maintenance cost than a steel structure. In this study a seed storage for a Seed Testing Laboratory should be designed with reinforced concrete structure, and a Seed Processing Plant and a Seed Storage House would take steel structures considering proposed sites and these construction periods.

6.4 Life Cycle Cost

Reviewing a building from the viewpoint of concept "Life Cycle Cost", running cost shares a large part of the cost. According to a data in Japan, running cost occupies 80% of that, while initial cost only occupies about 16%. Both initial cost and running cost generally are in correlation of that the higher is initial cost, the lower running cost.

While in the case of an air handling unit to air conditioning, running cost raises in proportion to a rise in initial cost. Running cost per year reportedly attains to one-fifth of initial cost.

Running cost consists of management cost, operation cost and maintenance cost. In the case of an air handling unit, 20% of the breakdown is the running cost, of this management cost is 10%, operation cost 5% and maintenance cost 5%. This numerical value means that cumulative running cost exceeds the initial cost in six years. An ample budget for running cost therefore should be required.

6.5 Maintenance Cost and Operation Cost

6.5.1 Maintenance Cost

As maintenance cost for a building, 0.5% of the construction cost should be appropriated and the cost should be increased in proportion to a rise in prices year by year.

Where :

Maintenance cost (M), Construction cost (C), Consumer prices rise {P (%)},
Years (n = 1, 2, ..., n)

$$M = C \times 0.005 (1 + P)^{n-1}$$

Consumer prices rise at an average 9 % per year in the Philippines. According to this, the maintenance cost of the first year after completion of the construction is as follows:

For example: Ilagan Experiment Station

Processing Plant (S) + Storage House (S) = 13.8 + 17.8 = 31.6 million peso

Therefore at the first year after completion of the work:

M_1 = 31,800,000 x 0.005 = P 159,000-

and at the second year:

M_2 = 31,800,000 x 0.005(1 + 0.09) = P173,310-

The first year Maintenance Cost in Model Regions (Unit : Peso / year)

	Maintenance Cost
Ilagan Experiment Station	158,000
San Mateo Seed Testing Laboratory	39,500
Visayas Experiment Station	277,500
Visayas Seed Testing Laboratory	40,000
Davao NCC.	120,500
Davao Seed Testing Laboratory	40,500
Tupi Seed Farm	66,000

6.5.2 Operation Cost

On the basis of demand charge of 20 Peso per KW and current charge of 2.5 Peso per KWH the operation costs of respective facilities are mainly calculated as an electrical charge in a year.

Each of electric power of planned buildings in every model area is as follows:

Seed Testing Laboratory	18.8 KW
Ilagan Experiment Station	46.0 KW
Visayas Experiment Station	85.0 KW
Davao NCC.	30.5 KW
Tupi Seed Farm	23.5 KW

(Unit : Peso / year)

	Operation Cost
Ilagan Experiment Station	96,600
San Mateo Seed Testing Laboratory	416,232
Visayas Experiment Station	178,500
Visayas Seed Testing Laboratory	416,232
Davao NCC.	64,050
Davao Seed Testing Laboratory	416,232
Tupi Seed Farm	49,350

As of the operation cost of the Seed Processing Plant and Seed Storage House in every Model Experiment Station, the charge is calculated as three-month operations in a year:

For example:

Total electric power of a newly planned Seed Processing Plant and a Seed Storage House in the Ilagan Experiment Station is 46.0 KW, and therefore

Demand charge = 46 kw x 20 peso/kw x 12 months = P11,040-
Current charge = 46 kw x 8 hours x 31 days x 3 months x 2.5 peso/kwh =P85,560-
Total =P96,600-

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

The existing buildings for Seed Testing Laboratory are too small and are inappropriate to show the function and achieve its purpose. The staff has problems regarding water consumption for Laboratory use. New laboratory buildings should be planned to improve and strengthen the function. An elevated water tank should be considered for the Laboratory as an exclusive use at the same time.

The existing buildings for Seed Processing Plant are hygroscopic and moist structures, and moreover in a defenseless structure against birds and vermin. When a seed processing plant is installed in every proposed site, a building for this plant should be newly constructed as a building by dry construction and as defensive structure against birds and vermin.

The existing buildings (Bodegas) for Seed Storage are inappropriate to store seed, eliminating thermal insulation, waterproof and dump proof. Besides a proposed building including an air-conditioning room has a lager capacity than the existing buildings. Buildings for this storage should be newly designed by using materials for thermal insulation, waterproof and in addition to measures against rats and mice. However, the external high temperature and high relative humidity that affect a life span of a kind of seed in room temperature and relative humidity are not yet clarified. A follow-up survey should therefore be requested in respect of relations between a life span of seed, moisture content of the seed and the ambient temperature and relative humidity, and the external temperature and relative humidity at the time.

7.2 Recommendation

7.2.1 To Expand Proposal Areas

The following Experiment Stations should be requested to expand the proposed area for buildings :

- Ilagan Experiment Station, Region II
- Cagayan Valley Experiment Station, Region II, for the Regional Seed Testing Laboratory
- Davao National Crop Center, Region XI, for the Regional Seed Testing Laboratory

7.2.2 To Obtain Water Supply

Need of water for buildings is a serious problem in every Station and Laboratory. Both electricity and water supply are basic requirements to modern buildings and lack of them results in degradation of their function. Resolution of this problem should make not only the function manifest but also the maintenance cost savable.

7.2.3 To Introduce an Idea of Physical Distribution

The big weight is put on storage of goods in a physical distribution system under pre-condition of that infrastructure has been already improved. Because the storage is not an economical thought, but are non-productive activities. Storage is a resistance of an electrical circuit. That stops a flow and consumes energy. It is therefore the best idea on a plan how least and how effectively storage houses could be constructed.

7.2.4 To Secure a Budget for Running Cost

A constructed building and building equipment request the running costs such as management, operation and maintenance costs, in addition to the initial cost. Among these running costs, an air handling unit has both a high initial cost and a high running cost. Implementation of the study therefore should be requested to procure the running costs for these buildings and the buildings' equipment.

Table G.1.1 EXISTING BUILDINGS FOR SEED

Region	Experiment Stations and Seed Farms	Testing Laboratories	Processing Plant	Storage Houses	Remarks
CAR	Buguias/Baguio NCC	-	-	-	
	Luna Seed Farm	-	-	0	
I	Digras Expt. Station	-	-	-	
II	Agricultural Pilot Center	0	-	-	
	Ilagan Expt. Station	-	0	0	
	Cagayan Valley Expt. Station	0	0	0	
	Abulog Seed Farm	-	0	-	
III	Phil. Rice Central Expt. Station	0	0	0	
NCR	BPI Central Office	0	-	-	
	Quezon City Central Nursery	-	-	-	
IV	Economic Garden NCC	0	-	-	
	Dr. M. L. Roxas Memorial Experiment Station	-	-	-	
	Tiaong Expt. Station	-	-	-	
	Mindoro Horticultural Center	0	0	-	
	Tanay Seed Farm	-	-	-	
	Palawan Seed Farm	-	-	-	
V	Bicol Expt. Station	0	0	0	
	Albay Expt. Station	-	-	-	
	Daet Seed Farm	-	0	0	
	Virac Seed Farm	-	-	-	
VI	La Granja NCC	-	0	0	
	Visayas Expt. Station /-1	0	0	0	
	Iloilo Seed Farm /-1	-	-	-	
	Guimaras Seed Farm	-	-	-	
VII	Mandaue Expt. Station	0	-	-	
	Bohol Expt. Station	-	0	0	
	Agricultural Productivity Center	-	-	-	
VIII	Romualdez Expt. Station	0	0	0	
	Abuyog Expt. Station	-	-	-	
	Gandara Seed Farm	0	-	-	
	Salcedo Seed Farm	-	-	-	
IX	Ipil Expt. Station	0	0	0	
X	Dalwangan Expt. Station	-	-	-	
	Bukidnon Seed Farm	-	-	-	
XI	Davao NCC	0	-	-	
	Tupi Expt. Station	-	0	-	
XII	Mindanao Expt. Station	0	0	0	
	Aroman Seed Farm	-	-	-	
	Kidapawan Seed Farm /-2	-	0	-	
	Amas Seed Farm /-2	-	-	0	

Notes: 1. /-1 & /-2 : Supervised by the same superintendent as a complex

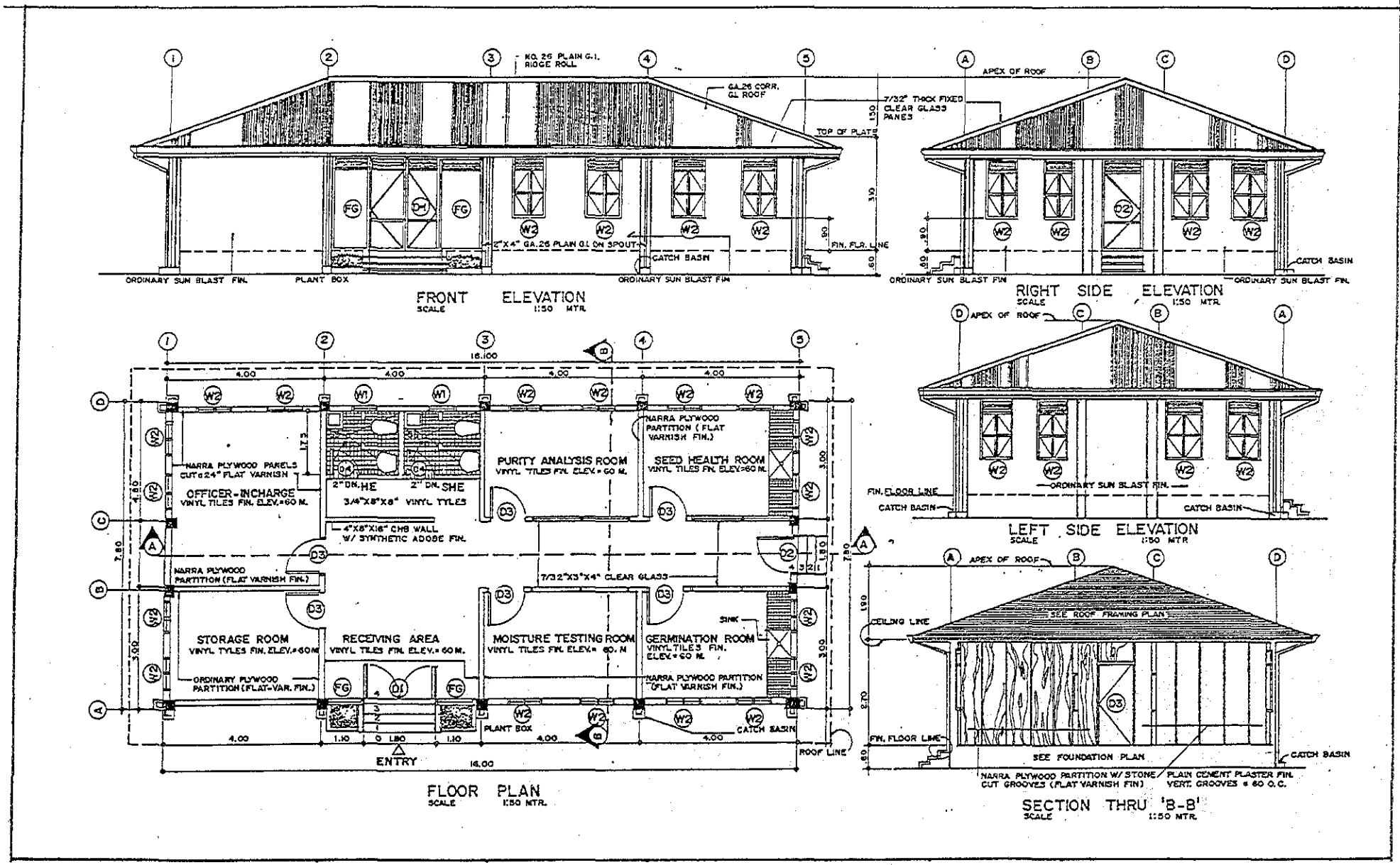
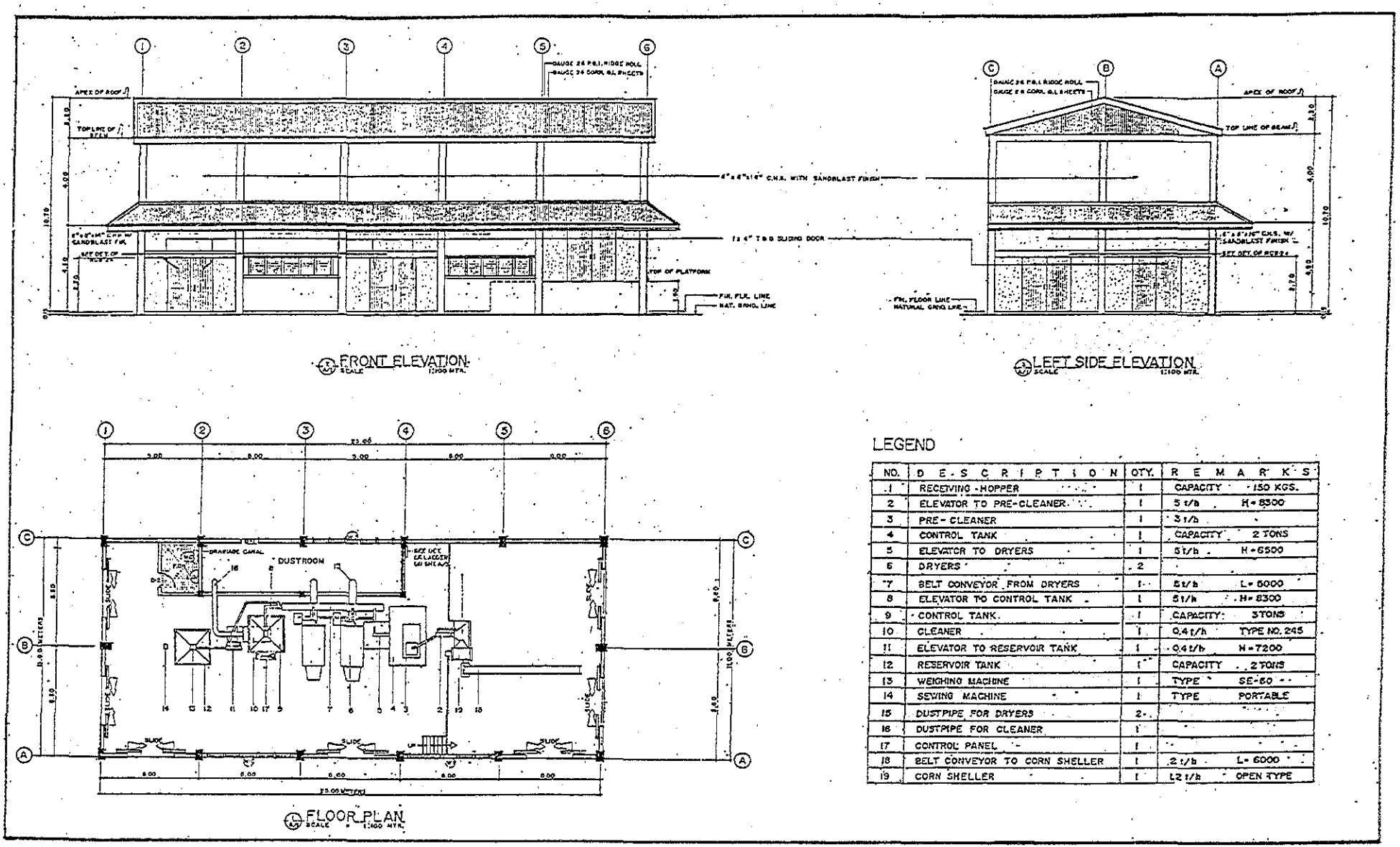


Fig. G.2.1 EXISTING SEED TESTING LABORATORY



LEGEND

NO.	D E S C R I P T I O N	QTY.	R E M A R K S
1	RECEIVING - HOPPER	1	CAPACITY 150 KGS.
2	ELEVATOR TO PRE-CLEANER	1	5 t/h H=8300
3	PRE - CLEANER	1	3 t/h
4	CONTROL TANK	1	CAPACITY 2 TONS
5	ELEVATOR TO DRYERS	1	5 t/h H=6500
6	DRYERS	2	
7	BELT CONVEYOR FROM DRYERS	1	5 t/h L= 5000
8	ELEVATOR TO CONTROL TANK	1	5 t/h H= 8300
9	CONTROL TANK.	1	CAPACITY: 3TONS
10	CLEANER	1	0.4 t/h TYPE NO. 245
11	ELEVATOR TO RESERVOIR TANK	1	0.4 t/h H=7200
12	RESERVOIR TANK	1	CAPACITY 2 TONS
13	WEIGHING MACHINE	1	TYPE SE-60
14	SEWING MACHINE	1	TYPE PORTABLE
15	DUSTPIPE FOR DRYERS	2	
16	DUSTPIPE FOR CLEANER	1	
17	CONTROL PANEL	1	
18	BELT CONVEYOR TO CORN SHELLER	1	.2 t/h L= 6000
19	CORN SHELLER	1	1.2 t/h OPEN TYPE

Fig. G.2.2 EXISTING SEED PROCESSING PLANT

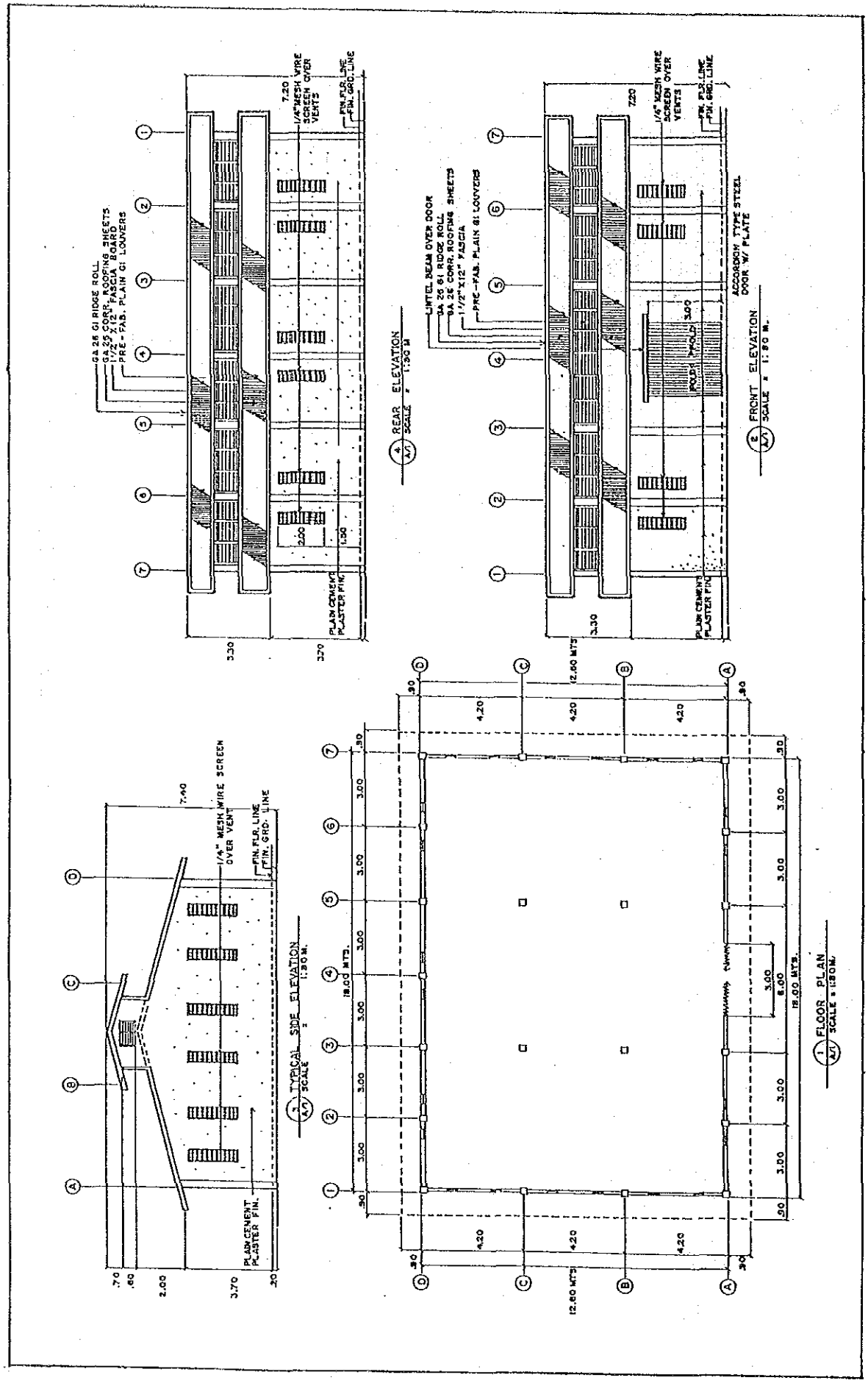


Fig. G.2.3 EXISTING SEED STORAGE HOUSE (BODEGA)

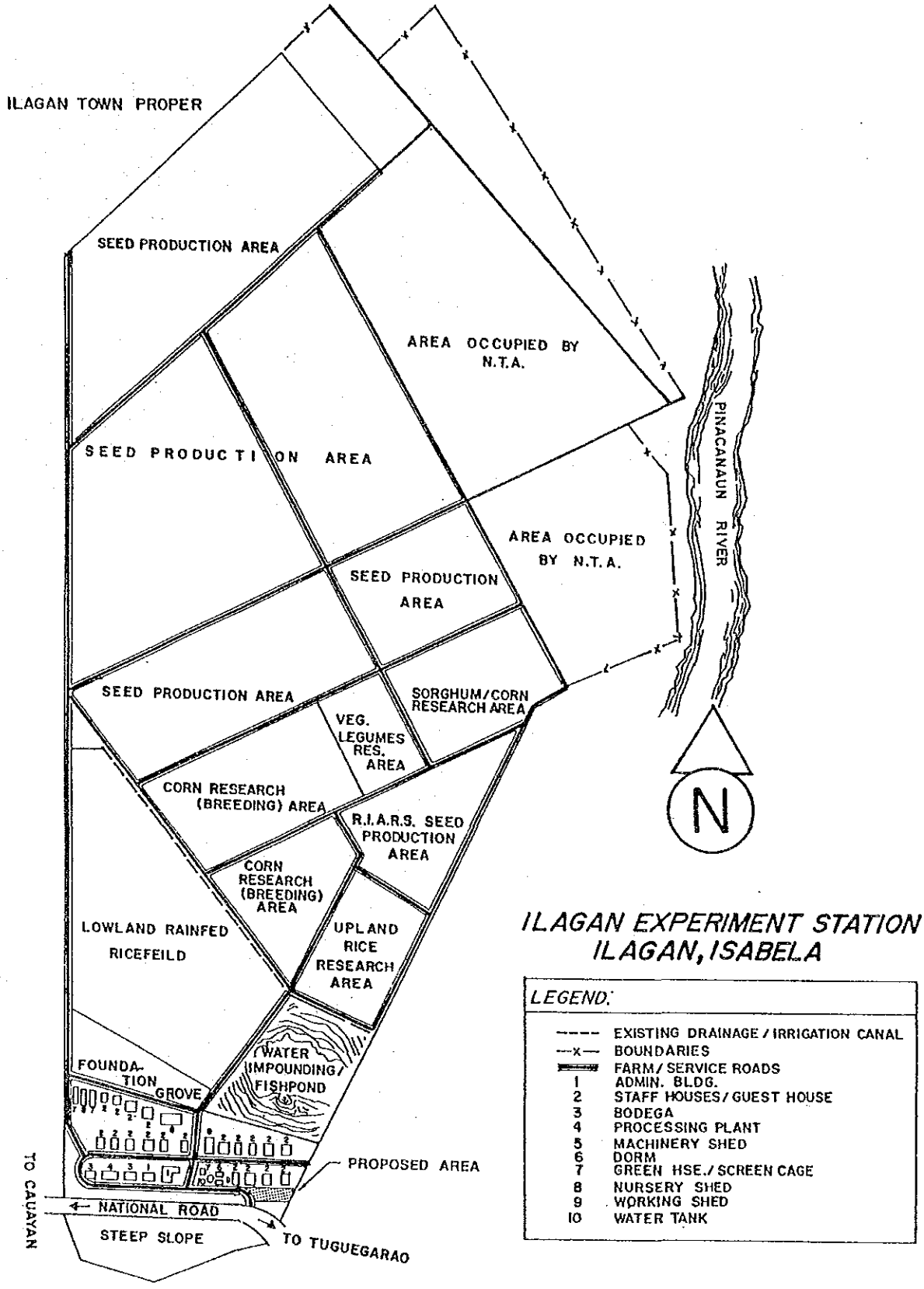


Fig. G.3.1 PROPOSED AREA IN ILAGAN EXPERIMENT STATION

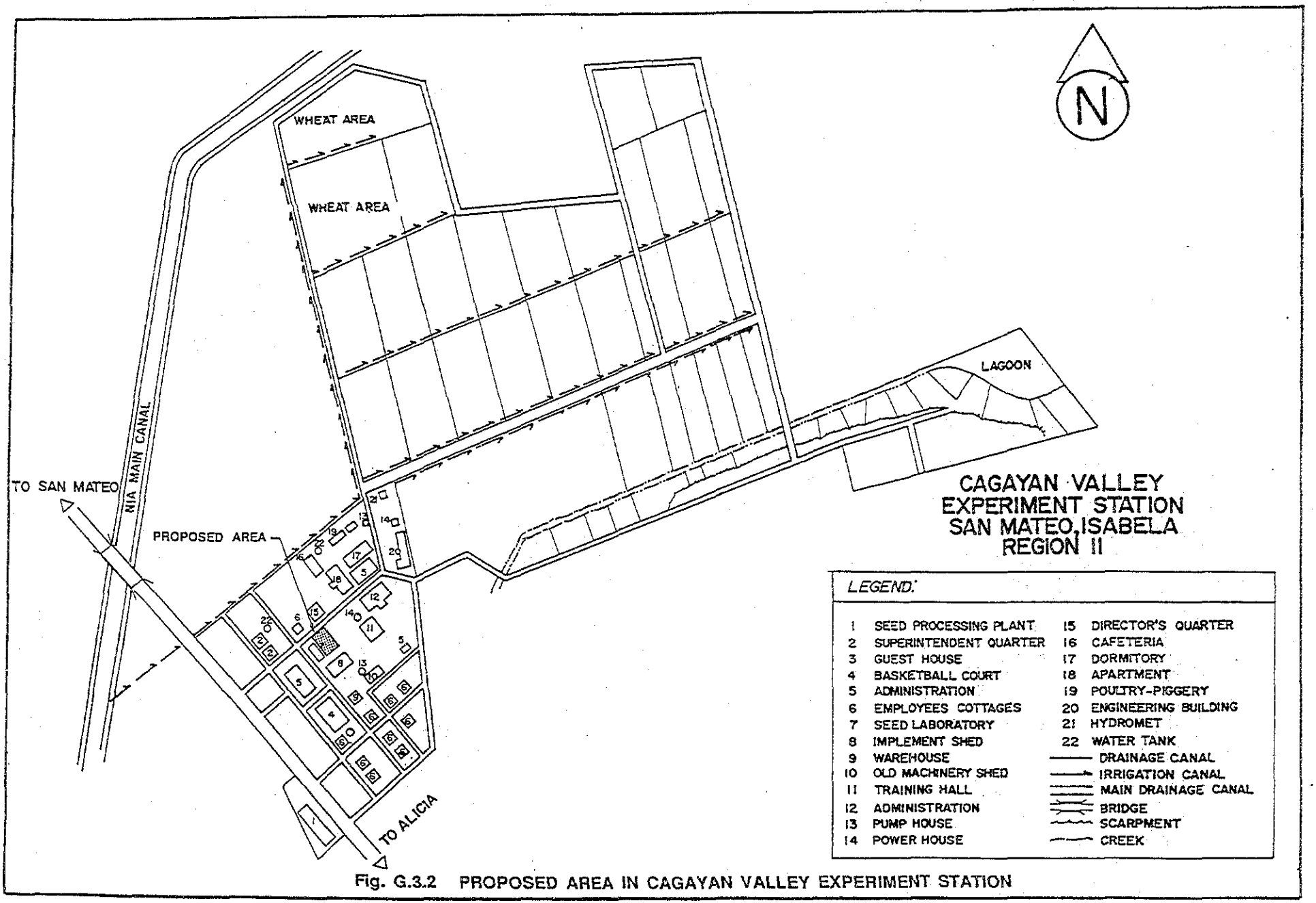


Fig. G.3.2 PROPOSED AREA IN CAGAYAN VALLEY EXPERIMENT STATION

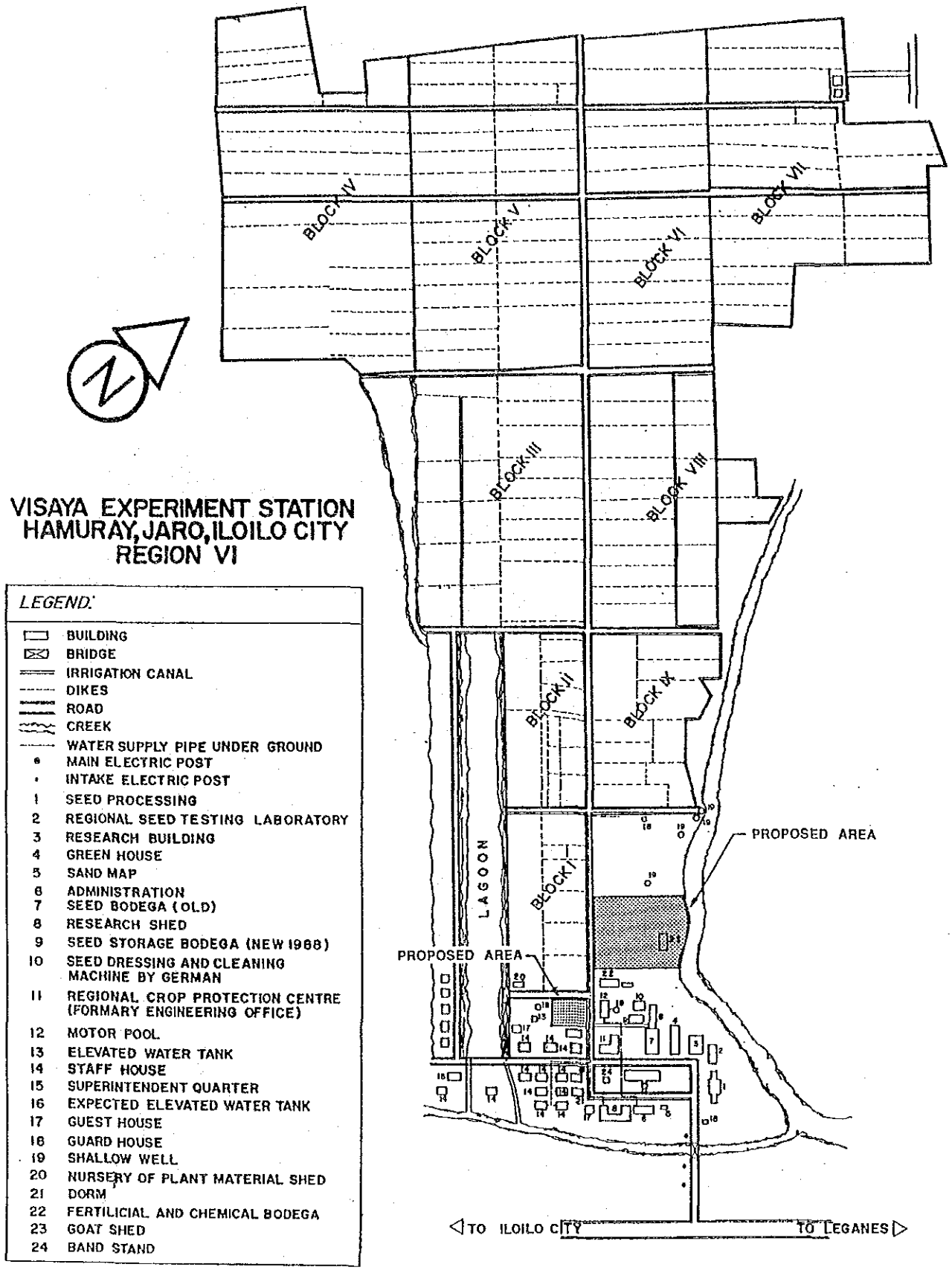
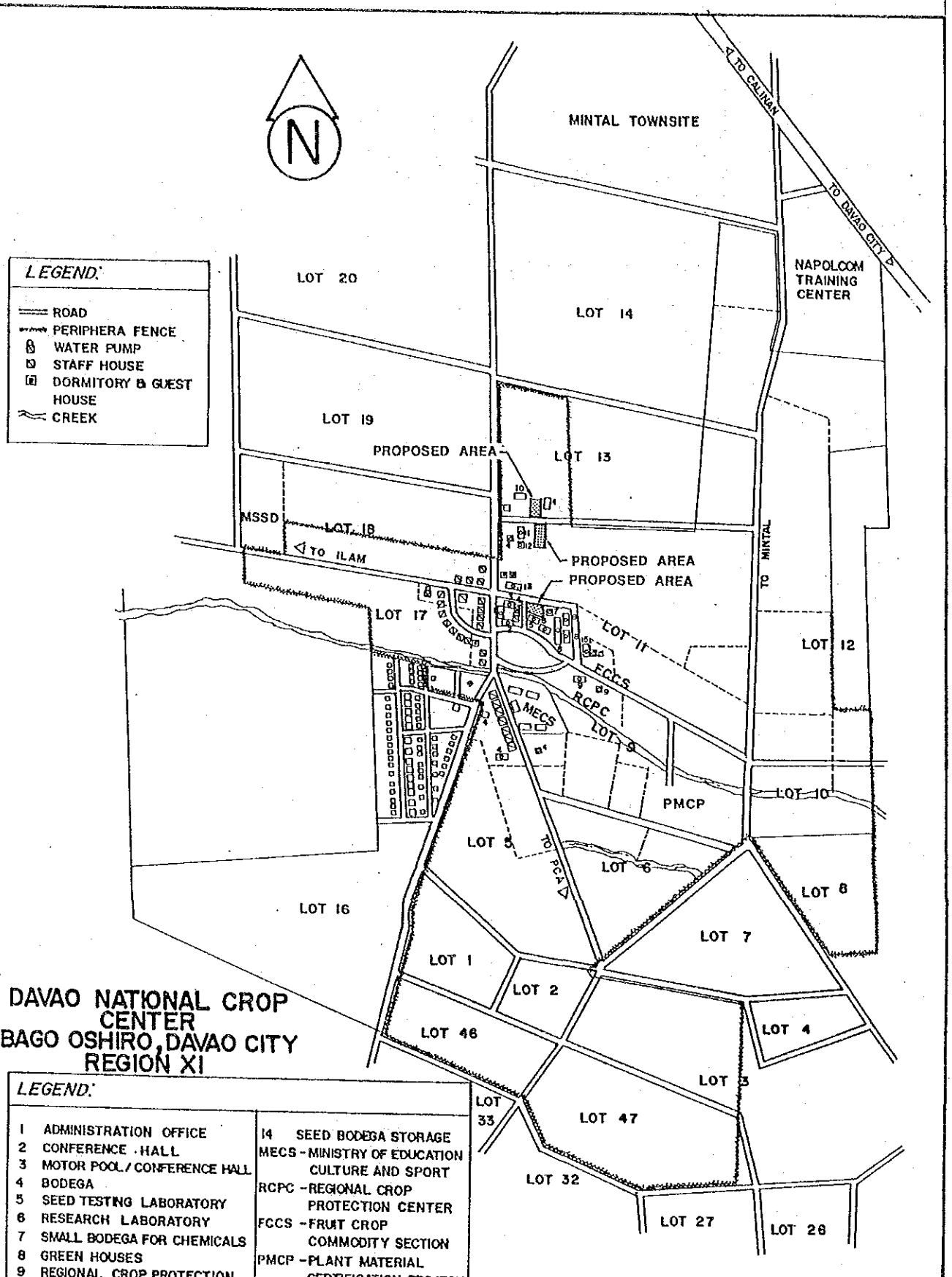


Fig. G.3.3 PROPOSED AREA IN VISAYAS EXPERIMENT STATION



DAVAO NATIONAL CROP CENTER
BAGO OSHIRO, DAVAO CITY
REGION XI

LEGEND:

1 ADMINISTRATION OFFICE	14 SEED BODEGA STORAGE
2 CONFERENCE HALL	MECS - MINISTRY OF EDUCATION CULTURE AND SPORT
3 MOTOR POOL / CONFERENCE HALL	RCPC - REGIONAL CROP PROTECTION CENTER
4 BODEGA	FCCS - FRUIT CROP COMMODITY SECTION
5 SEED TESTING LABORATORY	PMCP - PLANT MATERIAL CERTIFICATION PROJECT
6 RESEARCH LABORATORY	15 GLASS HOUSES
7 SMALL BODEGA FOR CHEMICALS	
8 GREEN HOUSES	
9 REGIONAL CROP PROTECTION CENTER OFFICE	
10 AGRICULTURE MACHINERY SHED	
11 OLD GARAGE	
12 OLD WOODEN BODEGA	
13 PRODUCTION BUILDING DIVISION	

Fig. G.3.4 PROPOSED AREA IN DAVAO NCC.

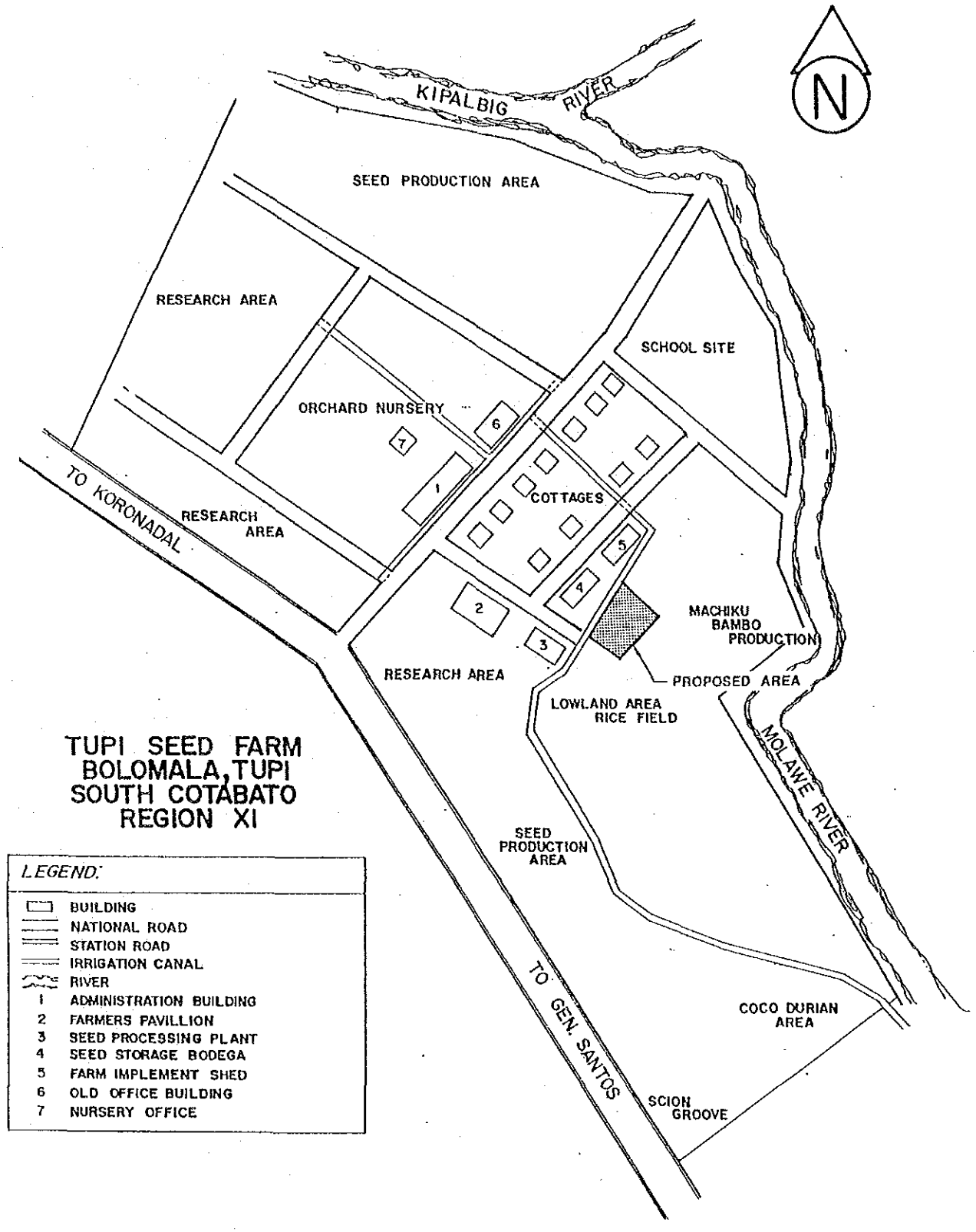


Fig. G.3.5 PROPOSED AREA IN TUPI SEED FARM

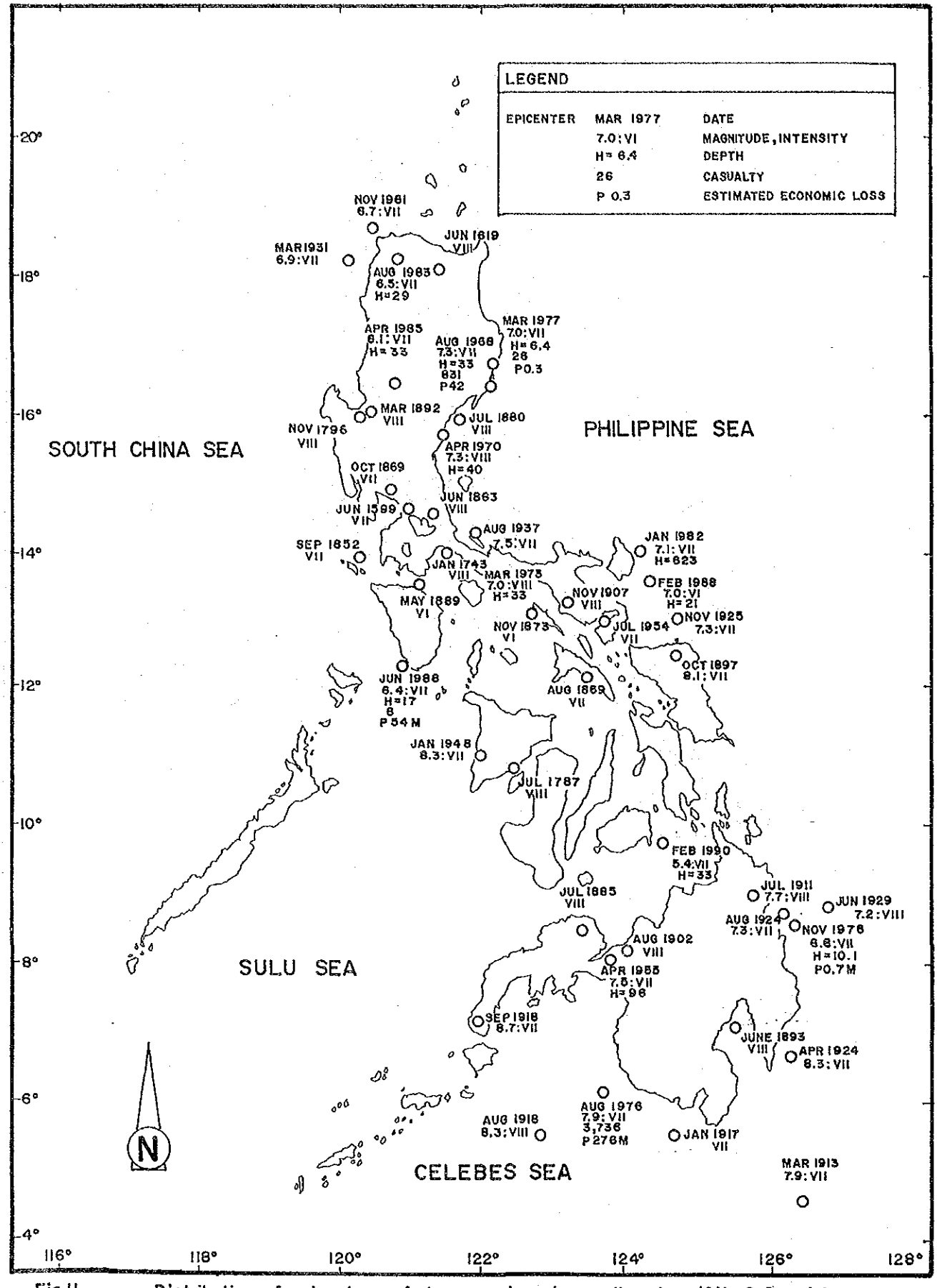


Fig.II Distribution of epicenters of strong and major earthquakes (M: · 6.0 and /or Intensity : · VI) in the Philippines (1599-1988)

Fig. G.5.1 MAJOR EARTHQUAKES IN THE PHILIPPINES

Republic of the Philippines
Department of Science and Technology
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY
5th & 6th Floors Hizon Bldg.
29 Quezon Avenue, Quezon City
Tel. Nos. 711-3066; 711-3444; 712-4658
Telex No. 65587 IOVAS PN

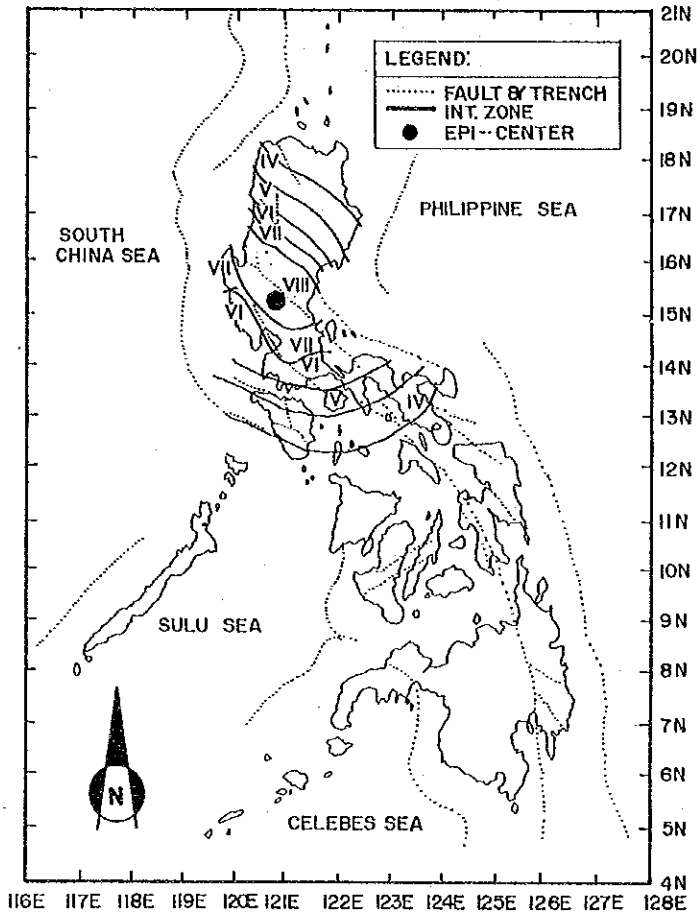
EARTHQUAKE INFORMATION NO.2
TIME AND DATE ISSUED: 9:15 A.M. (DST) 7-17-90
REPORT PREPARED BY: E. Amin, R. Tabanlar, P. delosReyes
NOTED BY: B. C. Bautista

BRIEF EVENT DESCRIPTION

Date of occurrence: 7-16-90
Time of occurrence: 4:26 P.M. DST
Duration: 45 second
MDA: Maximum Deflection
Location of epicenter: 15.6 N; 121.0E
or 90km NNW of Quezon City and
13km NNE of Cabanatuan City
Magnitude (surface): 7.7
Depth: shallow
Origin: Tectonic
Generated by the Philippine Fault Zone
Expecting damage and casualty: Yes
Tsunamigenic: No
Expecting aftershocks: Yes
Felt aftershocks: Yes

Cabanatuan City	Int. VIII
Baguio	Int. VIII
Agoo, La Union	Int. VIII
Dagupan	Int. VIII
Tarlac	Int. VIII
Manila	Int. VII
Quezon City	Int. VI
Tayabas, Quezon	Int. VI
Santa, Ilocos Sur	Int. VI
Callao, Tugegarao	Int. IV
Pasuquin, Ilocos Norte	Int IV
Bicol	Int. III

ISOSEISMAL MAP OF
THE 16 JULY 1990 EARTHQUAKES



Additional Information (as of 30 1990 July 5:00 P.M.):
Recorded aftershocks (PHILVOCS Quezon City station) 730
Felt aftershocks 92

Fig. G.5.2 ISOSEISMAL MAP OF THE 16 JULY 1990 EARTHQUAKES

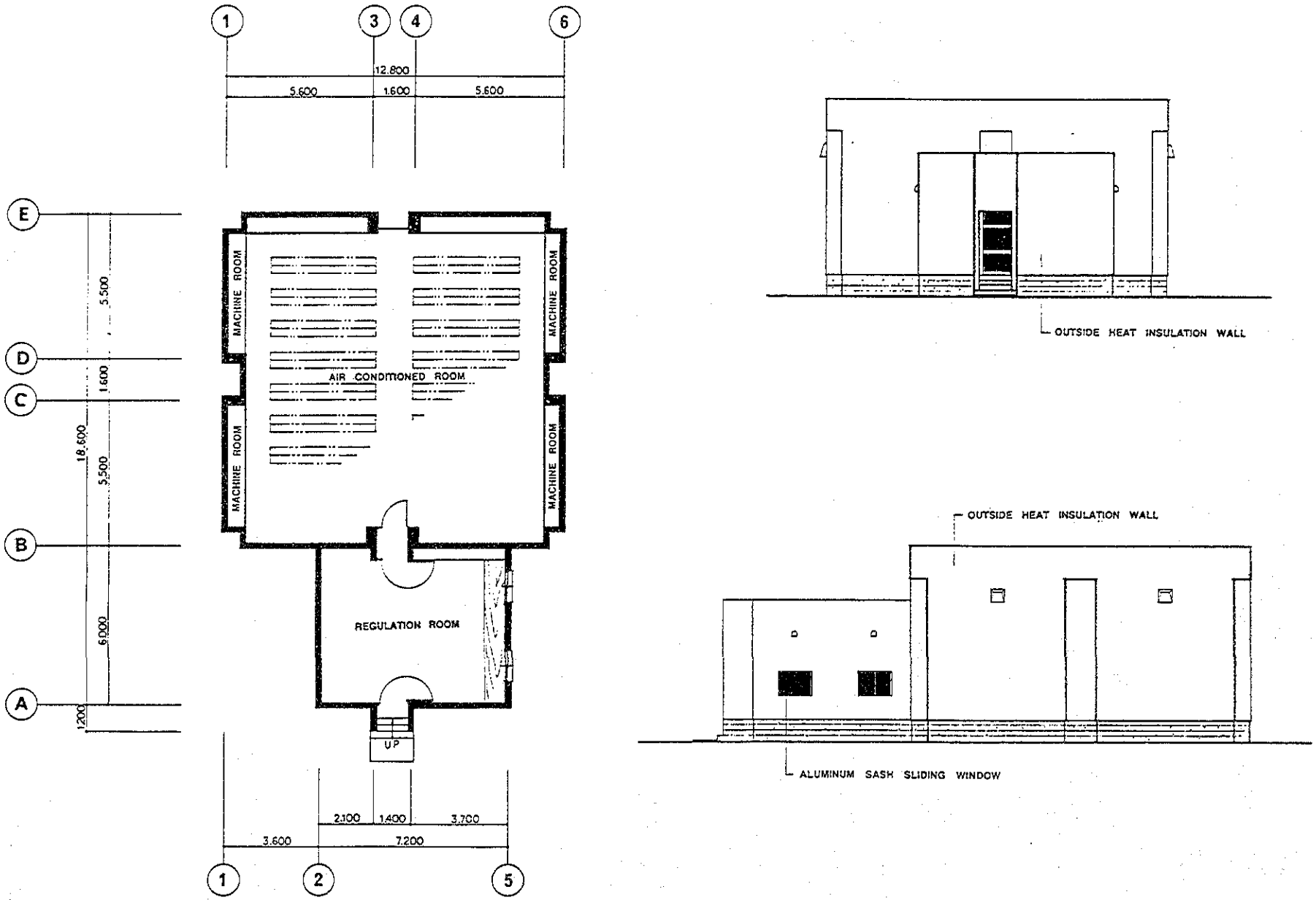
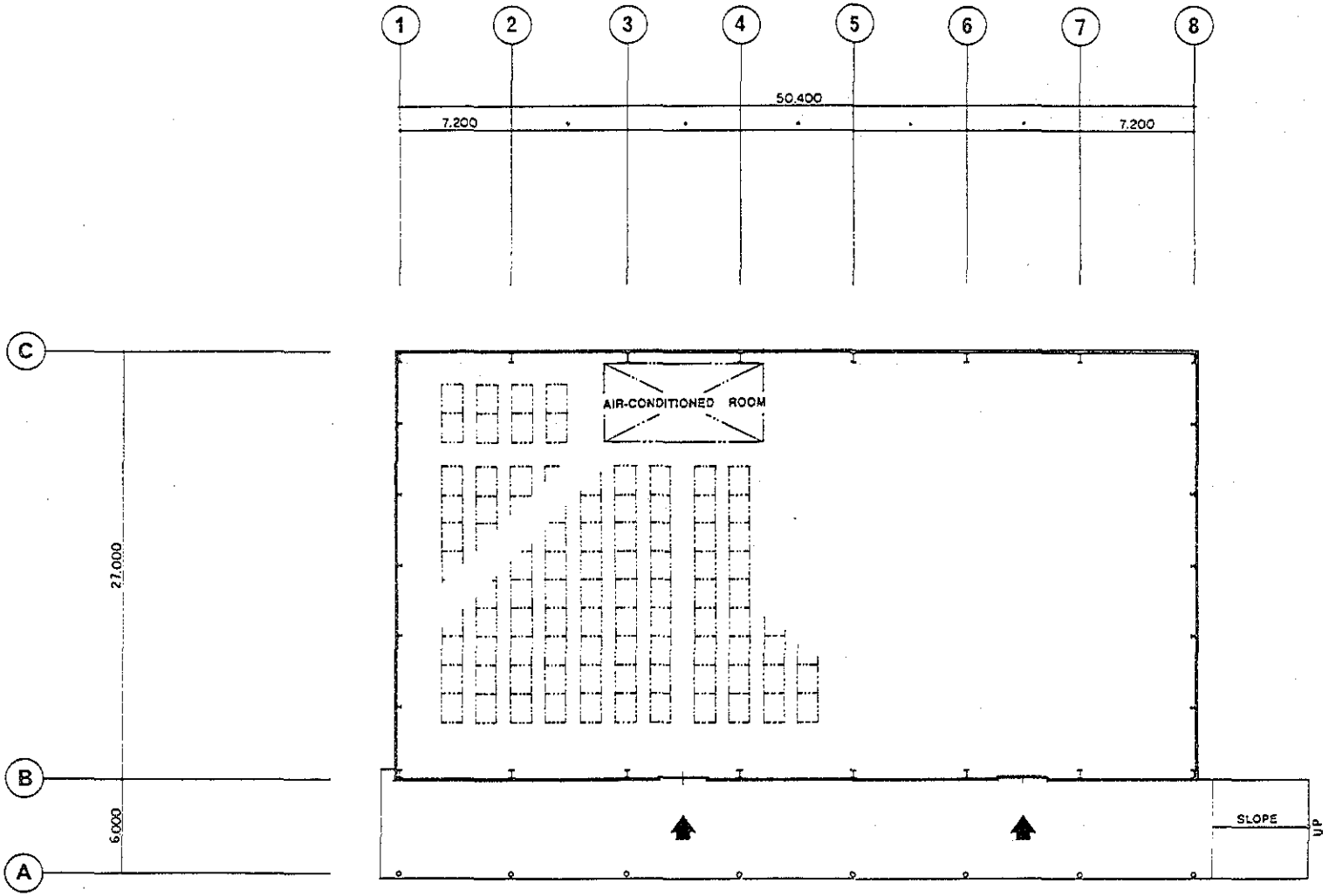
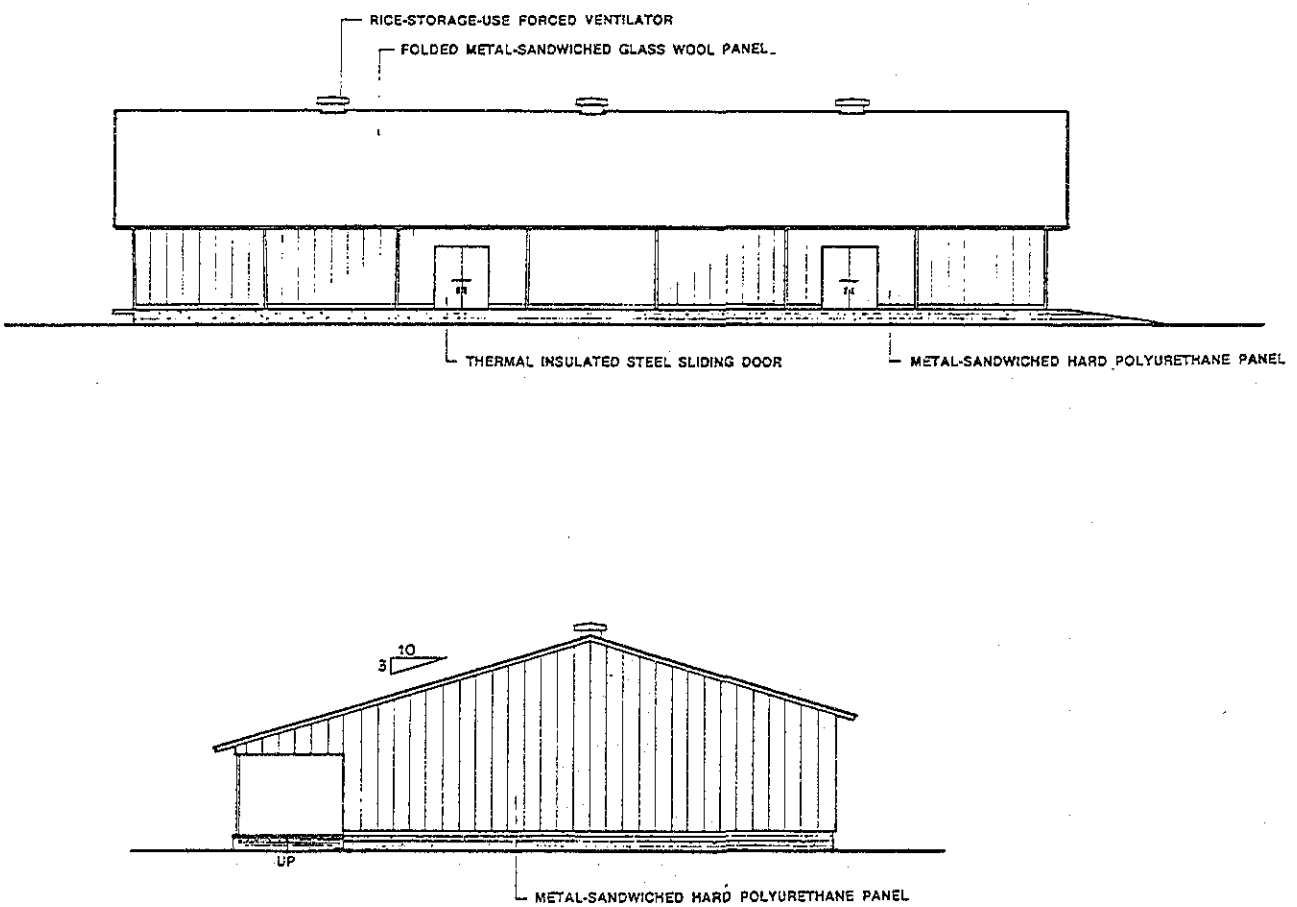


Fig. G.5.3 SCHEMATIC DRAWING OF SEED STORAGE HOUSE FOR STL



S = 1 : 200

Fig. G.5.4 SCHEMATIC DRAWING OF SEED STORAGE HOUSE (1/2)



S=1:200

Fig. G.5.4 SCHEMATIC DRAWING OF SEED STORAGE HOUSE (2/2)

Annex H

Seed Marketing and Distribution

FEASIBILITY STUDY ON
IMPROVEMENT OF SEED PRODUCTION AND DISTRIBUTION, AND
ESTABLISHMENT OF
APPROPRIATE SEED STORAGE SYSTEM

ANNEX H SEED MARKETING AND DISTRIBUTION

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1. PRESENT CONDITION OF THE COUNTRY

1.1 Government Seed Distribution System

1.1.1 General

Breeder seeds are produced by the Phil Rice Central Station and IRRI for rice, IPB and Ilagan Experiment Station for corn, and IPB and Economic Garden for peanuts. Agricultural Colleges and Universities also participate in breeding of rice, corn and peanuts. The BPI implements regular procurement and distribution of breeder and foundation seeds. Breeder seeds to meet the requirement of seed multiplication in each region are allocated to the experiment stations and seed farms under the BPI coordination. Surplus of foundation seeds in each region are procured by the BPI and distributed to regions where shortage of foundation seeds is caused by natural calamities or pest and disease outbreak. In addition to regular seed distribution activities, when some regions are suffered from natural calamities, the BPI coordinates certified seed procurement and distribution as emergency measures.

Generally, breeder and foundation seeds are equitably and proportionately allocated to the different regions according to the national seed production and distribution program through the regional and provincial seed coordinators designated in each regional and provincial agricultural offices. Regional federation and provincial seed producers associations coordinate directly with the regional and provincial seed coordinators for foundation and registered seed allocations.

1.1.2 Rice Seed Distribution

Breeder seed of rice is usually procured by the BPI and allocated regularly to the five stations consisting of the Phil Rice Central, Cagayan Valley, Bicol, Visayas and Mindanao Experiment Stations and La Granja National Crop Center for production of foundation seed. Rice seed distribution systems are shown in Fig. H.1.1. Those six (6) facilities distribute foundation seed to other stations and seed farms covering the following specific regions, and also distribute foundation seed to seed producers in provinces which are not covered by stations or seed farms.

Stations/Seed Farms	Covering Regions
Rice Seed	
-Phil Rice Central / Cagayan Valley E.S	I, II , III
-Bicol E.S	V
-Visayas E.S / La Granja NCC	VI, VII, VIII
-Mindanao E.S	IX, X, XI, XII
-BPI direct allocation	IV, CAR

Note : E.S ; Experiment station S.F ; Seed farm NCC ; National Crop Center
CAR ; Cordillera Autonomous Region

The above six (6) stations are comparatively well developed and in major rice producing areas, respectively. The regions covered by the respective stations are demarcated by geographical locations such as Northern and Central Luzon, Bicol, Visayas and Mindanao areas. Regular production and distribution of foundation seed are done by the above stations. The distribution of breeder seed to the above stations and foundation seed to other stations and seed farms in the respective regions is sometimes delayed which accrues difficulties for timely seed production.

1.1.3 Corn Seed Distribution

Corn seed distribution systems are shown in Fig. H.1.2. Hybrid seed are produced by the private seed companies, i.e. Pioneer, San Miguel, Cargill, etc., and distributed to seed dealers in provinces. In case of open pollinated corn, the government breeding institutes have been distributing breeder seed of corn directly to the following sixteen (16) stations and seed farms. The BPI is not procured breeder seed regularly from the breeding institutes at present due to the limited production of breeder seed.

Stations/Seed Farms	Covering Regions
Corn Seed	
-Ilagan E.S, Abulog S.F	I, II, III
-Economic Garden NCC, Tiaong E.S, Dr M.L.Roxas E.S	IV
-IPB	Distribute to BPI
-Daet S.F	V
-La Granja NCC	VI, VII
.....	.....
-Bohol E.S	VII
-Gandara S.F	VIII
-Romualdez E.S	- do -
-Ipil E.S	IX
-Dalwangan S.F	X
-Davao ECC	XI
-Kidapawan E.S	XII
-Luna S.F	CAR

Note : E.S ; Experiment station S.F ; Seed farm NCC ; National Crop Center
CAR ; Cordillera Autonomous Region

From 1984 to 1988, production of corn foundation seed was done by only the eight (8) stations or seed farms consisting of Ilagan E.S, Abulog S.F, Economic Garden NCC, IPB, Dr. M.L. Roxas E.S, Tiaong E.S, Daet S.F, and La Granja NCC. Foundation seed production in Dr. M.L. Roxas E.S, Tiaong E.S and Daet S.F was not regularly done, however. This means that breeder seed allocation is limiting to the above eight stations and is unstable at present. Timely production of seed is sometimes difficult due to delayed seed distribution.

1.1.4 Peanut Seed Production and Distribution

Peanut seed production and distribution has been done by only a limited number of stations and seed farms compared with those for rice and corn as shown in Fig. H.1.3. Breeder seed of peanuts has been procured by the BPI and allocated to the following nine (9) stations and seed farms covering specific regions :

Stations/Seed Farms	Covering Regions
Peanuts	
-Abulog S.F	CAR, I, II
-Ilagan E.S	- do -
-Palawan S.F, Tiaong E.S, Tanay S.F	IV, V
-Economic Garden NCC	- do -
-La Granja NCC	VI, VII, VIII
-Dalwangan S.F	IX, X
-Davao E.S	XI, XII

Note : E.S ; Experiment station S.F ; Seed farm NCC ; National Crop Center
CAR ; Cordillera Autonomous Region

Limited production of peanut breeder seed makes proper distribution difficult. Foundation seed is not regularly produced by the above stations. Ilagan E.S, Economic Garden NCC, Tiaong E.S, Tanay S.F and La Granja NCC have produced foundation seed since 1984, but their production has not been regular except at Ilagan E.S and Economic Garden NCC. Some of the stations are not suitable for producing peanut foundation seed due to low productivity and difficulties in foundation seed distribution to the other areas.

1.1.5 Government Certified Seed Procurement and Distribution

In early 50's to 70's, the BPI had been designated to undertake the procurement and distribution of rice and corn certified seed as government buffer stock using the fund of investment outlay. However in view of decentralization of the DA organization, those activities have been changed from centralized system to the regional operations and kinds of crop seed included not only rice and corn but also other crops such as field legumes,

vegetables and plant materials. Certified seed procurement of rice, corn and field legumes by the investment outlay was shown in Table H.1.2 to H.1.3 respectively. The investment outlay during 1987 to 1989 were increased 15 to 19 million/year and spent for the following seed procurement :

Item		1987	1988	1989	Average
Rice					
Quantity	(ton)	1,389	1,446	1,505	1,447
Amount	(₱'000)	7,716	8,036	10,032	8,595
Corn					
Quantity	(ton)	123	103	123	116
Amount	(₱'000)	3,045	3,219	3,988	3,417
Peanut					
Quantity	(ton)	14	31	30	25
Amount	(₱'000)	275	625	759	553
Others					
Amount	(₱'000)	4,293	3,460	4,512	4,088
Total Amount	(₱'000)	15,329	15,340	19,291	16,653

The investment outlay plan for the procurement of rice, corn and field legumes during 1991 to 1995 was prepared by the BPI as shown in Table H.1.4 to H.1.6 respectively. This plan aims at the procurement of 15 % of the national requirements as buffer stock as follows :

Item		1991	1992	1993	1994	1995
Rice						
Quantity	(ton)	1,010	1,054	1,106	1,153	1,208
Amount	(₱'000)	10,311	11,233	12,250	14,081	16,050
Corn						
Quantity	(ton)	123	126	132	136	140
Amount	(₱'000)	4,289	4,913	5,224	5,748	6,296
Legumes						
Quantity	(ton)	6.85	7.45	7.68	7.19	8.13
Amount	(₱'000)	214	262	308	356	408

Procurement and distribution of certified seed in case of natural calamities is an additional undertaking to rehabilitate the destructions on crops. The Disaster Coordinating Committee chaired by the Defence Secretary is implemented the emergency seed procurement and distribution activities in the national level under the coordination of the BPI, the DA regional and provincial agricultural offices. Certified seed procured by the investment outlay could be used to this emergency purposes. Procedures of procurement and distribution in the regional level are summarized as follows :

a) Seed coordinators in provincial and regional levels survey the requirement and availability of certified seed in the respective area.

b) Regional Agricultural Offices assess the balance of certified seed in the respective region and report to the head office of DA.

c) The DA regional operation office assesses the national balance of certified seed and arranges inter-regional seed procurement and distribution through the BPI.

d) Provincial and regional seed coordinators prepare seed procurement orders and procure certified seed from seed producers including stations and seed farms in the respective region.

e) Seed producers distribute certified seed under instructions from the seed coordinators concerned and receive payment from the Regional DA Office.

f) Provincial seed coordinators receiving certified seed arrange distribution to farmers.

Certified rice and corn seed procured by the above procedures is distributed to farmers at half the procurement price. First priority for distribution is given to totally damaged farmers who can receive the seed required for up to three (3) ha. Second priority is given to farmers who had a reduced harvest and who can receive the seed required for up to one ha.

1.2 Seed Distribution Record and Cost

The BPI's seed distribution activities for four years from 1986 to 1989 are shown in Table H.1.7 to H.1.9 and annual average of seed distribution is summarized as follows :

(Unit : kg)

Allocated Seeds	For Wet Season Cropping	For Dry Season Cropping	Total
Rice Seed			
Breeder Seed	662	487	1,149
Foundation Seed	1,774	447	2,221
Corn Seed			
Foundation Seed	259	825	1,084
Peanut Seed			
Breeder Seed	18	60	78
Foundation Seed	0	61	61

Rice seed allocation for wet season cropping was larger than for dry seasons, especially for foundation seed. On the other hand, corn foundation seed allocation for dry season cropping was larger than for wet seasons as well as peanut seed. The BPI has to allocate corn seed also in the event of drought damage during dry season planting. Peanut seed is mainly produced as a dry season crop, hence distribution of peanut seed is concentrated in dry seasons.

Seed distribution costs from the BPI head office to the stations and seed farms for the door to door delivery are shown in Table H.1.10 and may be summarized as follows :

(Unit : ₱)

Destination	Per Sack (40 kg)	Per Kg
Luzon	< 200	< 5
Mindoro	200	5
Visayas	150 - 250	3.75 - 6.25
Mindanao	260 - 300	6.50 - 7.50

The BPI usually uses private transportation companies for seed distribution. Polyethylene bags are used for seed transportation of rice, corn and peanuts.

1.3 Private Seed Marketing Activities

Information on seed procurement and marketing activities of seed growers is based on the results of interview surveys of 39 seed growers in Cagayan Valley, Visayas, Southern Mindanao Regions.

Registered seed growers procure foundation seed from the stations or seed farms in their respective regions through the arrangement by provincial seed coordinators. In case of certified seed, most of the seed growers procure from the stations/seed farms and/or registered seed growers in the respective regions. Some seed growers, however, procure from the stations outside their respective region such as Phil Rice Central Station and IRRI as follows :

(Unit : %)

Item	Rice Seed	Corn Seed	Peanut Seed
Within the Region			
From station/seed farm	52	80	100
From other seed producer	34	20	0
Out of the Region			
IRRI, Phil Rice Central	14	0	0

Delayed registered seed production and shortage of registered seed in the area accrue procurement of seed outside the respective regions. Proper allocation of registered seed produced by seed growers is difficult due to insufficient coordination by provincial or regional seed producers associations. Seed producers sell registered seed solely on a commercial basis. Seed producers' major problems in seed procurement may be summarized as follows :

a) shortage of seed in the stations for farmers' requirements,

b) delayed allocation of seed for timely planting by seed producers,

c) uneven allocation of seed between seed producers by the stations,

d) shortage of favored varieties of seed, and

e) transportation difficulties.

Producers' seed selling destinations on the basis of the interview surveys may be summarized as follows :

(Unit : %)

Item	Rice Seed	Corn Seed	Peanut Seed
Approved Seed	78	15	100
Government procurement	(50)	(12)	-
Neighboring farmers	(14)	(3)	100
Middleman	(7)	-	-
Producers' cooperatives	(7)	-	-
Others(Non certification seed)	22	85	-

Government procurement of seed is carried out under the Production Enhancement Program of rice and corn. Around a half of the rice seed was procured by the government, hence most of the rice seed growers interviewed were considered to be participants of the above program. Marketing channels for open pollinated corn seed are underdeveloped as

compared with hybrid corn seed, hence marketing quantity as seed was limited to only 15% of the total product.

Rice seed is sold from October to December for the wet season harvest and from April to June for the dry season harvest. Most of the seed producers sold their products around thirty (30) days after harvest both in the wet and dry seasons. Some of growers sold only during the fifteen (15) days after harvest both in the wet and dry seasons. One respondent sold dry season seed eighty (80) days after harvest, but such long storage of seed by producers is considered to be rare. Major constraints on producers' seed marketing may be summarized as follows :

a) Transportation difficulties due to lack of own transportation facilities and high cost; no joint transportation or marketing activities by seed producers exist in any provinces,

b) No good facilities for long storage of seed, and

c) Limited marketing channels and shortage of information on seed buyers especially for corn and peanut seed.

The average selling price of certified seed is ₱6.7/kg for rice, ₱15/kg for corn and ₱20/kg for peanuts. Most seed growers feel that the government procurement prices of certified seed are lower than prevailing marketing prices. In fact, around thirty (30) percent of the rice seed producers sold at ₱7.1 - 8.0/kg in 1989 compared with the government price of ₱6.7/kg on the basis of the questionnaire survey to the seed growers carried out in December 1989 to January 1990.

(Unit : ₱/kg)

Price of Certified Seed	Rice Seed	Corn Seed	Peanut Seed
Average selling price of producers	6.7	15.0	20.0
Government procurement price*	6.7	12.5	20.0

Note : * July 1989

The latest government recommended prices of the objective seed in April 1990 are summarized as follows :

(₱/kg)

	Peanut		Rice		Corn	
	Buying	Selling	Buying	Selling	Buying	Selling
Foundation Seed	20	23	9.4 (425/cav.)	9.8 (440/cav.)	20	22
Registered Seed	20	23	8.7 (390/cav.)	9.0 (405/cav.)	18	20
Certified Seed	20	23	8.0 (360/cav.)	8.3 (375/cav.)	15	17

Note: 1 cavan of rice seed; 45 kg

2. CONSTRAINTS ON SEED MARKETING AND DISTRIBUTION SYSTEM

The stations' networks for seed procurement and distribution are still weak and underdeveloped on corn and peanut seed compared with rice seed. The stations and seed farms for multiplication of corn and peanut foundation seed are nominated at sixteen (16) and nine (9) sites in the country, respectively. While number of stations regularly producing foundation seed are limited to five (5) for corn ; Ilagan E.S, Abulog S.F, Economic Garden NCC, IPB and La Granja NCC, and two (2) for peanut ; Ilagan E.S and Economic Garden NCC. Breeder seed allocation of corn and peanut is limited to the specific stations and unstable at present mainly due to :

1) Production capacities for breeder seed in Ilagan E.S for corn, Economic Garden NCC for peanuts and IPB for corn and peanuts are not sufficient for proper seed allocation among the stations,

2) No concrete production and distribution programs for corn and peanut seed based on concrete production program like the Rice Production Enhancement Program,

3) No strategical determination of stations producing corn and peanut foundation seed based on regional seed requirement and covering other stations and seed farms producing registered seed, and

4) Limited BPI's coordination activities for corn breeder seed allocation as a lead agency; BPI's activities on corn seed allocation are limited to surplus of foundation seed from the stations.

In addition to the specific constraints on corn and peanut seed, common constraints of the study crops are summarized as follows :

1) Weak monitoring and follow-up systems of the BPI Central Office and the DA Regional Offices for the government seed production and distribution activities; seed production and distribution activities of stations concerned have not been monitored completely, hence constraints for seed production and arising needs for procurement of parent seeds are not clarified. Communication and reporting systems between the stations and BPI or DA Regional Offices are not established for timely activity,

2) Delayed distribution of breeder and foundation seed arises difficulties for timely seed production and distribution to other stations or seed farms ; most of the stations do not have sufficient and proper storage facilities for breeder and foundation seed.

In addition to the above constraints in the government, the following difficulties were identified in seed procurement and marketing by seed producers:

1) Inaccessibility to the stations or seed farms for some seed producers living in remote areas,

2) Lack of information on the availability of foundation and registered seed in the stations. Seed growers have difficulties in proper timing to start planting due to delayed allocation of seeds,

3) Insufficient quantity of seeds, especially foundation and registered seeds of corn and peanuts,

4) Shortage of favorable varieties of seed, and

5) Weak organization activities of seed producers associations for seed procurement and marketing, i.e. no joint procurement of seeds together with no joint activities for processing, storage and marketing in general.

3. BASIC IMPROVEMENT PLAN OF SEED MARKETING AND DISTRIBUTION IN THE COUNTRY

3.1 Nationwide Seed Marketing and Distribution System

The present seed marketing and distribution activities need to be improved through reorganization and strengthening of the system. The BPI as a lead agency for seed production and distribution in the Philippines has an important role for the improvement of seed marketing and distribution system. The following strategies could be applying for the reorganization and strengthening of the present nationwide system :

1) Stable seed supply system of open pollinated corn and peanuts should be established by increasing the production of breeder seed. Increase in breeding capabilities of existing breeding institutes and initiation of breeding activities in a proper National Crop Center (NCC) are required.

2) For the stable and timely supply of foundation seed, the present seed production and distribution system should be reorganized on the basis of conditions of seed production and location for seed distribution in the seed production facilities concerned. Facilities for foundation seed production should cover a block basically consisting of several regions, i.e. Luzon, Visayas, Mindanao Areas, and their production capabilities should be increased.

3) The role of BPI in seed marketing and distribution should be as follows :

   - To prepare the seed production and distribution plan,
   - To notify the above plan to the related institutes,
   - To monitor progress of seed production and distribution activities, and
   - To coordinate distribution of breeder seed to blocks and of foundation seed to each region.

On the basis of the above improvement strategies, the nationwide seed marketing and distribution system for rice , corn and peanut seed will be recommended as follows :

(1) Nationwide Rice Seed Marketing and Distribution System

Nationwide rice seed distribution system including networks after foundation seed distribution is comparatively well organized centering in Phil Rice Central Experiment Station as a breeding institute. The improvement of rice seed distribution could be based on the

present seed distribution system, while the following improvements will be required in addition:

a) Plan for breeder seed allocation from Phil Rice Central Experiment Station, IRRI, agricultural colleges and universities should be prepared by the BPI. The plan will include breeder seed production by the stations as well as varieties and destination for seed allocation.

b) The distribution area of foundation seed by each multiplication station at present should be set at the following regions. Appropriate seed storage facilities at each foundation multiplication station will be required for stable seed supply to covering other stations. (See Fig. H.3.1)

Block	Stations	Covering Regions
Northern/Central Luzon, Southern Tagalog	Cagayan Valley E.S Phil Rice Central E.S	CAR, I - VI
Bicol	Bicol E.S	V
Visayas	Visayas E.S, La Granja NCC	VI - VIII
Mindanao	Mindanao E.S	IX - XII

Note : E.S; Experiment Station, NCC; National Crop Center
CAR; Cordillera Autonomous Region

c) The communication system between the BPI and the stations concerned should be improved for the timely distribution of breeder and foundation seed.

(2) The nationwide Corn and Peanut Seed Marketing and Distribution System

The BPI has a plan for the development of La Granja NCC as a center for research and development on upland crops including field legumes and corn. From the viewpoint of breeding capability, the conditions for seed production and location for seed distribution, La Granja NCC is superior to other stations. It is recommended that La Granja NCC should have a function for breeding activities and breeder seed multiplication of open pollinated corn and peanuts for increase in breeder seed production. The present corn and peanut seed distribution system should be reorganized and strengthened by the following improvement :

a) La Granja NCC should be developed as a research and development institute for corn, peanut and other upland crops and cover Visayas and Mindanao Areas for stable distribution of breeder seed.

b) A plan for corn and peanut breeder seed allocation from the existing breeding institutes including La Granja NCC should be prepared by the BPI as well as a plan for rice seed. The breeding institutes will consist of IPB, La Granja NCC, agricultural colleges and university for corn and peanut, Economic Garden NCC for peanut, and Ilagan E.S for corn.

c) The distribution area of breeder and foundation seed by each multiplication station should be set at the following blocks and regions. Appropriate seed storage facilities at each multiplication station will be required for stable seed supply to covering other stations. (See Fig. H.3.2 and H.3.3)

Breeding Institute/Block	Stations	Covering Regions
I. Corn Seed		
IPB / Ilagan E.S		
Northern Luzon	Abulog E.S, Ilagan E.S	CAR, I, II
Central Luzon/ Southern Tagalog	Economic Garden NCC, IPB	III, IV
Bicol	Daet S.F	V
La Granja NCC /Mindanao State University		
Visayas	La Granja NCC	VI, VII
	Romualdes E.S	VIII
Mindanao	Ipil E.S	IX
	Bukidnon S.F	X
	Davao NCC	XI
	Amas-Kidapawan S.F	XII
II. Peanut Seed		
Economic Garden NCC/IPB/Colleges & University		
Northern Luzon	Abulog E.S, Ilagan E.S	CAR, I, II
Central Luzon/Bicol/ Southern Tagalog	Economic Garden NCC, IPB, Tiaong E.S, Palawan E.S	III, IV, V
La Granja NCC/Colleges & University		
Visayas	La Granja NCC	VI, VII, VIII
Mindanao	Bukidnon S.F	IX, X
	Davao NCC	XI, XII

Note : E.S; Experiment Station, S.F; Seed Farm,NCC; National Crop Center
CAR; Cordillera Autonomous Region

d) The communication system between the BPI and the stations concerned should be improved as well as the system for rice seed improvement.

3.2 Regional Seed Marketing and Distribution System

It is recommended in the seed production improvement plan that registered seed be produced by the government stations or seed farms as much as possible instead of the present production by private seed growers, but in case of shortage of capacities for registered seed

production, the stations can ask seed growers to produce on commission. This improvement could realize stable registered seed production within the regions, increase the quality of seed, ensure timely supply of seed and procurement of buffer registered seed. Buffer stock of certified seed to the extent of around 15% of the production target of certified seed is also recommended. Based on the above seed production improvement plan, the present regional seed distribution system should be strengthened by the following improvements :

a) The stations or seed farms for registered seed production should prepare a plan based on the requirements and procurement schedule for foundation seed and closely coordinated with a station distributing foundation seed.

b) In order to make it easier to distribute foundation seed and to procure registered seed, seed growers as required for production of registered seed should be selected in the vicinity of the government stations. Registered raw seed produced by the seed growers will be procured by the station. After drying and cleaning of raw seed in the stations' processing plants, the registered seed together with stations' seed will be stored.

c) Buffer stock of registered seed for use in natural calamities should be made in the stations.

d) Registered seed should be timely distributed to certified seed growers through regional and provincial seed coordinators and field inspectors concerned.

e) Buffer stock of certified seed should be produced by the specific certified seed growers which should be selected in the vicinity of government stations to simplify transportation of seed. Specific areas in the same location, i.e. tertiary irrigation blocks for rice, could be organized as a buffer certified seed production area for implementation of integrated seed production activities. Buffer certified seed will be processed and stored in the stations concerned.

The above outline of the regional seed marketing and distribution system is shown in Fig. H.3.4. It is required that the above improvement system should be realized through estimation of appropriate volume of buffer seed stock, determination of proper storage location, selection of buffer certified seed growers and producing area on the basis of regional situations.

3.3 Monitoring System for Seed Production and Distribution

The nationwide and regional seed production and distribution programs need to be prepared on the basis of respective crop production plan. For the formulation of practicable programs and their effective implementation, coordination works among the BPI, the Phil Rice, the Division of Planning and Monitoring in the DA Head Office, the regional agricultural offices, and breeding institutes out of the DA are essential. It is recommended that "a coordination meeting on seed production and distribution" be held regularly by the above institutes concerned.

Based on the consensus in the above meeting, the BPI can notify the seed production and distribution program to the breeding institutes, the stations for foundation seed multiplication and the regional agricultural offices. The regional agricultural offices need to notify the regional program to the stations or seed farms for registered seed multiplication and the seed producers associations.

Progress on seed production and distribution activities should be regularly reported to the BPI. The breeding institutes and the foundation multiplication stations should report directly to the BPI. The regional agricultural offices need report the progress at the regional level consisting of production and distribution of registered and certified seed by the stations and seed growers.

For the establishment of timely coordination activities on seed production and distribution, the capabilities for collection and analysis of data and information in the Seed Production Division of the BPI should be increased. The outline of the system improvement from planning to monitoring is shown in Fig. H.3.5.

4. PRESENT CONDITION OF THE MODEL AREAS

4.1 *Outline of Seed Marketing and Distribution System* in the Model Areas

Experiment stations and seed farms producing parent seed in the Model Areas are Ilagan Experiment Station and Abulog Seed Farm for peanut seed in Region II , Visayas Experiment Station and La Granja National Crop Center for rice seed in Region VI and Davao National Crop Center and Tupi Seed Farm for corn seed in Region XI. La Granja and Davao NCCs are directly managed by the BPI and the other stations and seed farms are under the respective DA regional offices.

Ilagan E.S, Visayas E.S and Davao NCC are centers for objective seed production and distribution in the respective regions. Peanut seed production in Abulog S.F is inactive due to unstable distribution of foundation seed from Ilagan E.S. There are no large peanut producing area in and around Abulog S.F. Rice seed production in La Granja NCC is unstable and limited to wet season due to no proper irrigation system. Rice seed distribution area from La Granja NCC to the seed growers is limited to Negros Island, while seed distribution is unstable and short to the seed demand in the area. Hence the registered and certified seed are distributed from Visayas E.S and/or seed growers in the other provinces in Region VI. Tupi S.F distributes mainly registered corn seed to seed growers within South Cotabato Province.

Those center stations in the respective regions procure the breeder and/or foundation seed directly from the IPB for peanut and corn seed, Economic Garden NCC for peanut, IRRI and Phil Rice for rice seed, or through the BPI, Manila. The foundation and registered seed produced by the above stations are distributed to the following registered and certified seed growers in the respective regions, to the other regions, or procured by the BPI and the DA crop production programs :

Item	Region II (Peanut Seed)	Region VI (Rice Seed)	Region XI (Corn Seed)
I. Stations in the Area			
1. B.S to F.S (F.S to R.S)	Ilagan E.S	Visayas E.S (La Granja NCC)	Davao NCC Tupi S.F
2. F.S to R.S	Abulog S.F	–	–
II. Source of Breeder Seed			
1. Institute (Location)	- Economic Garden NCC (Los Baños, Laguna) - IPB (- do -)	- IRRI (Los Baños, Laguna) - Phil Rice (Muñoz, Nueva Ecija)	IPB (Los Baños)
2. BPI Coordination	- Through BPI, but not always	Through BPI, but not always	Directly from IPB
III. Source of Foundation Seed			
1. Institute	IPB	–	- BPI, Manila - IPB
2. BPI Coordination	Not always	–	Not always
IV. Seed Growers			
1. Registered (F.S to R.S)			
a. Number	–	33	–
b. Area (ha)	–	43	–
2. Certified (R.S to C.S)			
a. Number	9	72	3
b. Area (ha)	10	500	5

4.2 Government Seed Procurement and Distribution Activities

4.2.1 *Procurement of Seed*

Ilagan E.S for peanut seed, Visayas E.S for rice seed, and Davao NCC and Tupi S.F for corn seed are procured breeder seed from the Breeding Institutes for the multiplication of foundation seed. While the distribution of breeder seed to the above stations is unstable except to Davao NCC for corn seed. Ilagan E.S was distributed breeder seed only in dry season cropping and was limited to 3 times in last 5 years. Tupi S.F was 4 times of wet season in 4 years. Foundation seed distribution to the above stations is considered as casual activities in case of the seed production damages by the natural calamities as follows (See Table H.4.1 to H.4.5) :

Item	Peanut Seed	Rice Seed	Corn Seed	
	Ilagan E.S	Visayas E.S	Davao NCC	Tupi S.F
1. Breeder Seed				
- Season	Dry	Wet & Dry	Wet & Dry	Wet
- Frequency	3 times/5 years	7 times/4 years	10 times/5 years	4 times/4 years
- Quantity (average in procured years)	120 kg	180 kg	56 kg	10 kg
2. Foundation Seed				
- Season	Dry	–	Wet & Dry	Dry
- Frequency (times in 5 years)	1 time/5 years	–	6 times/5 years	2 times/4 years
- Quantity (average in procured years)	10 kg	–	43 kg	8 kg

The DA regional office in Region VI procures certified rice seed of around 88 t using ₱ 700 thousand out of the total investment outlay of ₱ one million per year. The seed is mainly procured in Iloilo Province from dry season product and distributed to the affected farmers in the region by the natural calamities. After six months of storage in Visayas E.S, this buffer certified seed is sold as commercial paddy. This buffer is also used for distribution to the other regions under the Calamity Program.

4.2.2 Distribution of Seed

Visayas E.S regularly distributed rice foundation seed, while distribution of corn foundation seed from Davao NCC was seldom and the other stations' were unstable. Major destinations of foundation seed were the government procurement for peanut seed, seed growers within the regions for rice and corn seed. Distribution of registered rice and corn seed were regularly done, while registered peanut seed was distributed by Ilagan E.S at only 3 seasons in last 5 years. This limited distribution mainly arose from unstable distribution of breeder seed and shortage of foundation seed. Ilagan E.S has no peanut seed storage facilities for maintenance of germination till next planting season. Certified seed distribution from the stations is tending downward according to the seed production policy. The stations seed distribution activities were summarized as follows :

Item	Peanut Seed	Rice Seed	Corn Seed	
	Ilagan E.S	Visayas E.S	Davao NCC	Tupi S.F
1. Foundation Seed				
- Season	Dry	Wet & Dry	–	Wet
- Frequency	2 seasons/5 years	10 seasons/5 years	–	2 seasons/4 years
- Quantity (average in procured years)	500 kg	4,480 kg	–	620 kg
- Destination	DA (69%) BPI (22%) Region II (9%)	BPI (2%) Other Region (17%) Region VI (81%)	–	Region XI (100%)
2. Registered Seed				
- Season	Wet & Dry	Wet & Dry	Wet & Dry	Wet & Dry
- Frequency	3 seasons/5 years	10 seasons/5 years	10 seasons/5 years	8 seasons/4 years
- Quantity	460 kg	31,100 kg	5,090 kg	13,370 kg
- Destination	DA (19%) Region II (81%)	Other Region (7%) Region VI (93%)	Other Region (45%) Region XI (55%)	Region XI (100%)
3. Certified Seed				
- Season	Wet & Dry	Wet & Dry	Wet & Dry	Wet
- Frequency	4 seasons/5 years	8 seasons/5 years	4 seasons/5 years	1 season/4 years
- Quantity	2,200 kg	10,040 kg	1,670 kg	610 kg
- Destination	DA (58%) BPI (9%) Region II (33%)	Region VI (100%)	Region XI (100%)	Region XI (100%)

4.2.3 Seed Storage

Seed storage was commonly done by the stations except Davao NCC which has no seed storage facilities. Duration of seed storage was limited to less than 6 months for rice and corn seed in Visayas E.S and Tupi S.F respectively and 2 months for peanut seed in Ilagan E.S due to easy deterioration of seed quality under normal condition. Quantity of seed stored in the warehouses was varied by months and seed crops. The peak storage period of rice seed was during March to May after dry season harvest because rice seed need to be stored up to wet season cropping and wet season demand is bigger than dry season. In case of corn seed, the peak storage period was during October to December after wet season harvest . Corn seed as well as commercial corn was produced mainly in wet season under rainfed condition. Peanut seed storage in Ilagan E.S was limited to the dry season product during June to July because seed production was mainly done in dry season. Seed storage activities in the stations were summarized as follows :

Item	Peanut Seed	Rice Seed	Corn Seed	
	Ilagan E.S	Visayas E.S	Davao NCC	Tupi S.F
1. Kind of Seed	F.S, C.S	F.S, R.S, C.S	–	F.S, R.S, C.S
2. Month Stored				
- Wet season harvest	–	Feb. - July	–	Aug. - Jan.
- Dry season harvest	May - July (2 months)	Aug. - Jan. (6 months)	–	Feb. - July (6 months)
3. *Quantity Stored (t)*				
- F.S	0 – 0.9	0.5 – 11.2	–	0 – 2.3
- R.S	–	0 – 33.7	–	0 – 8.5
- C.S	0 – 3.0	0 – 7.6	–	0 – 2.5

4.3 Private Seed Marketing Activities

4.3.1 Procurement of Seed

Peanut seed growers in Region II exist only in Maddela municipality, Quirino province. Source of foundation and registered seed of peanut is limited to Ilagan E.S. The parent seed distribution from Ilagan E.S was unstable, hence peanut seed production by the seed growers is inactive at present. Commercial peanut producers are using non-certified peanut seed prepared from the previous cropping or buying from the neighboring farmers and traders who brought from Pangasinan Province in Region I.

Registered rice seed growers in Region VI are procuring foundation seed from Visayas E.S and selling registered seed to the certified seed growers located in the same province. Procurement of rice parent seed is well coordinated between the station and seed growers under the supervision of regional and provincial seed coordinators as well as the provincial seed producers associations and their federation.

Corn seed growers in the Region XI are officially appointed in 1990 for the promotion of Corn Productivity Enhancement Program (CORN PEP), hence demarcation between registered and certified seed growers is unclear. Foundation seed from Tupi S.F or the DA Regional Office has been distributed to certified corn seed growers appointed in South Cotabato province or Davao city and Davao del Sur province. Distribution of registered seed from the above agencies and Davao NCC has been done in parallel with foundation seed. The corn seed distribution as well as seed procurement by the corn seed growers is not well coordinated. The system and organization for corn seed procurement and distribution in the Region should be established.

Based on the questionnaire survey to the seed growers in the Model Areas as shown in Table H.4.6, peanut, rice and corn seed growers are procuring parent seed before 11, 22 and 19 days from the planting respectively. Parent seed procurement by the seed growers is done before or during land preparation at least.

4.3.2 *Seed Marketing*

Seed marketing activities by the seed growers in the Model Areas are summarized as follows :

Item	Region II (Peanut Seed)	Region VI (Rice Seed)		Region XI (Corn Seed)	
	Dry S.	Wet S.	Dry S.	Wet S.	Dry S.
1. Sold as seed (%)	58	82	76	65	64
- Cooperatives	(43)	(–)	(–)	(14)	(14)
- Middleman	(15)	(8)	(4)	(10)	(10)
- Farmers	(–)	(17)	(28)	(38)	(38)
- Government (DA)	(–)	(57)	(44)	(3)	(2)
2. Home use, others (%)	42	18	24	35	36
Total	100	100	100	100	100
3. No. of days sold after processing	20 days (7-30 days)	37 days (5-60 days)	41 days (15-60 days)	31 days (5-40 days)	27 days (10-40 days)

Marketing quantity of peanut seed was limited to less than 60 % of total seed product in Maddela, Region II. Peanut seed is produced at around one ha per grower only in dry season, hence home use of seed is larger. Peanut seed was sold within one month and 20 days on an average after processing of seed. Major seed marketing outlet is the Maddela Peanut Planters Cooperative.

Rice seed growers in Region IV was selling around 80 % of the total seed product after one month on an average from the seed processing. The government seed procurement was predominant sharing 57 % in wet season and 44 % in dry season, and marketing shares directly sold to commercial farmers was 17 % and 28 % respectively. Certified seed produced by the seed growers in the region is distributed to the other regions i.e. Bicol, Bohol, Leyte, Palawan under the coordination of the regional seed coordinator as well as the seed producers associations. The quantity of certified seed distributed during 1987 to 1989 was around 200 to 300 t/year as follows :

(Unit : t)

1987	1988	1989	Average
315	225	292	277

Marketing share of corn seed in Region XI was around 65 % to the total product. Around 38 % of the product were sold to commercial farmers at one month after seed processing. The government procurement of corn seed was limited to a few percent.

4.3.3 Seed Storage

The seed growers stored the less than half of seed product in the own traditional warehouse. Longest period for seed storage was 3 months for rice and 2 months for peanut and corn. Seed storage activities by the growers are summarized as follows :

Item	Region II (Peanut Seed)	Region VI (Rice Seed)		Region XI (Corn Seed)	
	Dry S.	Wet S.	Dry S.	Wet S.	Dry S.
1. Period (days)					
- Longest	60	180	180	60	60
- Shortest	7	5	7	5	7
- Average	26	67	66	28	31
2. Storage quantity (%) to total product	37	32	41	47	47

4.4 Seed Marketing Cost and Prices

4.4.1 Seed Prices

The foundation and registered seed were bought or sold at the official recommended prices in the Model Areas. While the price of certified seed was fluctuated by season. Prices for certified rice seed and non-certified corn seed became largest in wet season planting because commercial production area in wet season was larger than that in dry season. Price of non-certified peanut seed became largest in dry season harvesting. This means that high quality peanut seed can be produced from dry season cropping in the Region II and the seed demand from the outside of the Region, especially from Region I, exists. Price of certified rice seed in wet season planting was ₱ 8.5/kg and higher than the official recommended price of ₱ 8.3/kg, while the other seasons' prices were lower than the recommended price. Non-certified seed prices for peanut and corn were lower than the recommended prices in any seasons. Seed prices for peanut in wet season planting and corn in wet and dry season

harvesting became lower than the farmgate prices for commercial crops on an annual average. Prevailing prices of seed in the Model Areas may be summarized as follows :

Seed Crops	Highest Seed Price		Lowest Seed Price		Average Price (₱/kg)	Commercial Crop Farmgate Price* (₱/kg)
	Price (₱/kg)	Month	Price (₱/kg)	Month		
Peanut (Non Certified)	11.5-20.0	April - May During Dry Season Harvesting	7.5	May - June During Wet Season Planting	10.0	10.0
Rice (Certified)/Paddy	8.5	June During Wet Season Planting	4.5	Oct. - Dec. During Wet Season Harvesting	7.5	4.1
Corn (Non-Certified)	15.7	April During Wet Season Planting	6.0	Feb. & Aug. During Wet and Dry Season Harvesting	9.1	5.3

* Annual average

4.4.2 Seed Marketing Cost

Public bus was commonly used for the procurement of parent seed from the stations, while joint procurement was seldom done by the provincial seed producers association or cooperatives. Transportation costs for peanut and corn were varied with the distance from ₱ 8 to 17 per 20 kg. In case of rice seed in Region VI, cost for seed transportation is decided by the federation of seed growers association, i.e. the unit cost is ₱0.15/km/45kg and the maximum is set at ₱10/45kg of which distance is equivalent to around 67 km. The cost for transportation may be summarized as follows :

Seed Crops	Origin	Destination	Transport Means	Cost (₱/unit)
Peanut	Ilagan E.S	Maddela, Qurino	Bus	₱17/20 kg
Rice	Visayas E.S	Each Province	Truck/Bus	₱0.15/km/45 kg/1
Corn	Davao NCC	Davao City Proper	Bus	₱15/20 kg
	Tupi S.F	Koronadal	Bus	₱ 8/20 kg
		Norala	Bus	₱15/20 kg

/1: Including loading and unloading, maximum ₱10/45 kg decided by the Federation of Seed Growers Association in Region VI.

4.5 Planning and Monitoring System for Seed Production and Distribution

Regional seed production and distribution activities is planned by the regional seed coordinators on the basis of parent seed availability and the requirement of the crop production programs. While the seed production programs in Region II for peanut and Region XI for corn were not reflected the local situations, i.e. the shortage of parent seed, stations' conditions for seed production, limited number of seed growers and their seed field, and the production target was usually set at larger than the seed production capability in the regions. In case of Region VI, the foundation rice seed was over produced in Visayas E.S compared with the regional requirement. And the production of registered rice seed was over than the requirement of certified seed growers.

After the reorganization of the DA through the decentralization policy, the coordination between the seed coordinators, the stations and seed growers seem to be weak in general. For example, production activities by the stations and seed growers, especially on the number and area of seed growers by locations and class of seed produced are not monitored concretely. Seed production and distribution by the stations and seed growers are not done orderly, hence over production or shortage of seed arose.

Field inspectors assigned by each DA provincial office have an important monitoring role for seed production activities of seed growers. Field inspectors have to report the results of field inspection and seed stocks of seed growers for seed sampling every month to the provincial seed coordinator as well as the regional seed testing laboratory. While those reportings were not smoothly done due to shortage or no assignment of full time seed inspectors as well as lack of transportation measures for the inspectors. Monitoring procedures from the provincial office to the regional office, the DA head office and the BPI Manila are as shown in Fig.H.4.1.

The regional seed testing laboratories practically has a data consolidation function of regional seed production and distribution activities. While the shortage of manpowers and no data processing facilities make timely data consolidation and analysis for the planning difficult. The monitoring activities by the regional seed coordinator as well as the planning and management section attached to the regional director are relied on the seed testing laboratory at present. For the effective monitoring activities in the regional level, monitoring procedures on data collection, reporting, data consolidation and evaluation should be rationalized. Practical seed production and distribution program in the Model Areas, consisting of production target of the stations and seed growers, time schedule of seed production and distribution, coordination activities on seed procurement and distribution, field

inspection and seed testing schedule, recruitment and training of seed growers, etc. will be prepared on the basis of proper assessment of present situation of seed production and distribution.

5. MODEL IMPROVEMENT PLAN

5.1 Basic Concepts for the Improvement

For the formulation of improvement plan on seed marketing and distribution in the Model Areas, the following basic concepts were applied :

1) Ilagan E.S for peanut seed, Visayas E.S for rice seed, and Davao NCC and Tupi S.F for corn seed are selected to produce respective classes of seed in the Model Areas. Tupi S.F will cover South Cotabato Province which is producing around 80 % of corn in Region II. Davao NCC will cover the other provinces in Region XI. Abulog seed farm in Region II is not suitable as a support station for registered peanut seed production due to the remote location from main peanut producing areas in Isabela and Quirino Provinces. A development project in La Granja NCC for crop research and small scale farming systems development is prepared by the DA, hence the improvement of seed production and distribution functions in La Granja NCC is excluded from the Model Improvement Plan. Hence the objective area covered by Visayas E.S will be the provinces other than Negros Occidental Province which will be supported by La Granja NCC.

Class of Seed	Peanut Seed (Region II)	Rice Seed (Region VI)	Corn Seed (Region XI)
F.S, R.S	Ilagan E.S	Visayas E.S	Davao NCC*
R.C	-	-	Tupi S.F*

F.S ; Foundation seed, R.S ; Registered seed, C.S ; Certified seed
* ; including certified seed production

2) In case of shortage of capacities for registered seed production in the objective DA stations, deficit registered seed could be produced by the selected seed growers under the supervision of the DA regional offices. Registered seed growers should be selected in the vicinity of the objective DA stations.

3) For the effective seed production and distribution in the Model Areas, the buffer seed storage will be indispensable. Buffer stock requirement of foundation,

registered and certified seed for the objective crops is set at 100 %, 20 % and 10 % respectively according to the DA seed production program.

4) Seed processing plant and storage facilities to be established in the area of the objective stations will be utilized not only for the stations' product but also for the registered and buffer certified seed from the selected seed growers in the vicinity of the stations. For the proper processing of buffer certified seed, appropriate seed processing facilities should be provided and utilized by the seed growers located at other than the stations' provinces under the supervision of the DA provincial offices. Transportation facilities will be required for effective seed procurement and distribution between the stations and seed growers.

5.2 Proposed Marketing and Distribution System

Seed storage activities according to the seed production plan in the Model Areas will be implemented in the objective stations for buffer storage and carrying over between wet and dry seasons, and in the provincial level for the buffer certified rice seed in the Region VI. Seed storage plans in the Model Area were prepared on the basis of the following conditions :

1) Buffer stock for foundation and registered seed of peanut, rice and corn seed, which is 100 % and 20 % to the seed production respectively, will be kept in the objective stations. Buffer stock seed respectively procured from the wet and dry seasons will be replaced by the seed newly harvested in the next same season. Old buffer stock seed can be planted as seed in the following season. Buffer requirement of 10 % to the certified peanut seed production will be kept in Ilagan E.S under the same storage and replacement operations. Surplus seed production to the requirement in the stations will be kept as a buffer stock. This surplus seed can be utilized as seed in other regions after the renewal of storage. The buffer storage period of foundation and registered seed for three crops and certified peanut seed will be kept for 12 months at most, hence conditioned seed storage will be recommended.

2) Buffer certified corn seed which is 10 % of the seed production will be procured from the seed growers and kept in the Tupi S.F from South Cotabato and Davao NCC from other provinces in Region XI. Visayas E.S will store the buffer certified rice seed for Iloilo and Guimaras Provinces, while storage facilities for the other provinces ; Aklan, Capiz and Antique, will be located at the respective provinces in order to reduce the seed transportation cost. Maximum storage

periods for rice and corn certified seed will be less than 8 months and 6 months respectively, hence those need to be stored in the improved warehouses other than the ordinary ones.

3) Carrying over seed between wet and dry seasons need to be stored in the improved warehouses to use in the following season at most for 6 months.

The required capacities for buffer and carrying over seed storage as well as their storing periods in the Model Areas are shown in Fig. H.5.1 to H.5.3 and required capacities by conditions and purposes may be summarized as follows :

(Unit :t)

Item	Peanut Seed	Rice Seed	Corn Seed	
	Ilagan E.S (Region II)	Visayas E.S (Region VI)	DavaoNCC (Region XI)	Tupi S.F (Region XI)
1. Conditioned Storage				
(1) Buffer Storage				
Foundation Seed	2.7	1.8	0.3	-
Registered Seed	5.6	26.6	4.2	6.2
Certified Seed	26.0	-	-	-
Total Capacity	34.3	28.4	4.5	6.2
2. Improved Warehouse				
(1) Buffer Storage				
Certified Seed	-	191.0	43.8	80.6
(2) Carrying Over Storage				
Foundation & Registered Seed	22.0	36.3*	1.5*	1.3*
Total Capacity	22.0	227.3	45.3	81.9

* ; *Shortage of the storage capacities will be supplemented by using storage capacity for the buffer certified seed.*

Seed marketing and distribution plans in the Model Areas as shown in Fig. H.5.4 to H.5.6 were prepared taking the seed production plans, seed storage plans, and locations of the objective stations, and existing and potential seed growers into consideration and summarized as follows :

(1) Peanut Seed Marketing and Distribution in Region II

Foundation and registered seed will be produced in Ilagan E.S except registered seed production in dry season. Registered seed growers of around 14 ha will be selected in the vicinity of Ilagan E.S for the supplemental production in dry season. The registered seed produced by the growers will be transported to Ilagan E.S and processed by the station's facilities. Registered seed will be distributed to the certified seed growers in Maddela,

Quirino Province where Maddela Peanut Plantors Cooperative is organized and a most active body for commercial and seed production of peanuts in the Region II.

Buffer certified seed produced in Maddela will be transported to Ilagan E.S after semi-drying and processing. Conditioned storage facilities for peanut certified seed in Ilagan E.S might be utilized for the transit seed storage from Maddela to Isabela and Cagayan Provinces. Commercial peanut farmers in the above two provinces could get certified seed at anytime in Ilagan E.S.

Processing facilities as well as storage warehouse for certified buffer seed should be provided in Maddela and used by the seed growers under the supervision of DA Quirino Provincial Office. For the effective procurement and distribution of registered seed and buffer certified seed stock between Ilagan E.S and respective seed growers, provision of transportation facilities will be indispensable.

Certified peanut seed for wet and dry season planting of 45 t and 215 t respectively will be distributed to the commercial peanut farmers in Region II which will be used at 45 ha and 215 ha of peanut field.

(2) Rice Seed Marketing and Distribution in Region VI

Foundation and registered seed will be produced in Visayas E.S except registered seed production in dry season. Registered seed growers of around 5 ha will be selected in the vicinity of Visayas E.S for the dry season production. The registered seed produced by the growers will be transported to Visayas E.S and processed. Registered seed will be distributed to the certified seed growers in the objective provinces other than Negros Occidental Province in Region VI. Procurement of registered seed from Visayas E.S should be jointly done by each provincial seed producers association under the coordination of regional and provincial seed coordinators.

Buffer certified seed produced in Iloilo and Guimaras Provinces will be transported to Visayas E.S after semi-drying and processing. The following buffer stock in Aklan, Capiz and Antique will be separately stored by each province under the supervision of respective DA provincial offices.

(Unit :t)

Province	Wet Season	Dry Season	Total
Aklan	24.9	40.5	65.4
Capiz	58.9	91.2	150.1
Antique	33.2	32.0	65.2
Iloilo	169.0	191.3	360.3
Total	286.0	355.0	641.0

Processing facilities as well as storage warehouses for certified buffer seed should be provided in Aklan, Capiz, Antique and Guimaras Provinces and used by the seed growers under the supervision of respective DA provincial offices. For the effective procurement and distribution of registered seed and buffer certified seed stock between Visayas E.S and respective seed growers, provision of transportation facilities will be indispensable.

Certified rice seed for wet and dry season planting of 3,229 t and 2,597 t respectively will be distributed to the commercial rice farmers in Region VI which will be used at 39,860 ha and 32,060 ha of rice field.

(3) Corn Seed Marketing and Distribution in Region XI

Foundation, registered and certified seed will be produced in Davao NCC and this foundation seed produced will be distributed to Tupi S.F. Registered seed of Tupi S.F will be distributed to the certified seed growers in South Cotabato Province and the seed of Davao NCC to the provinces other than South Cotabato in Region XI. Procurement of registered seed from the above DA facilities should be jointly done by each provincial seed producers cooperative under the coordination of regional and provincial seed coordinators.

Buffer certified seed produced in the respective provinces will be transported to Davao NCC and Tupi S.F after semi-drying and processing. Processing facilities for certified buffer seed should be provided in the five provinces other than Davao City and used by the seed growers under the supervision of respective DA provincial offices. For the effective procurement and distribution of registered seed and buffer certified seed stock between Davao NCC/Tupi S.F and respective seed producers cooperatives, provision of transportation facilities will be indispensable.

Certified corn seed for wet and dry season planting of 1,244 t and 376 t respectively will be distributed to the commercial corn farmers in Region XI which will be used at 62,200 ha and 18,800 ha of corn field

5.3 Proposed Planning and Monitoring System

For the preparation of practical seed production and distribution plan in the Model Areas, the regional seed coordinators should cooperate more closely with the objective DA stations, seed growers associations or cooperatives as well as the BPI and the breeding institutes concerned. Based on the informations and data on an availability of parent seed procured from the breeding institutes, production capability of foundation and registered seed in the objective DA stations, and requirement of registered and certified seed distributed to seed growers and commercial farmers respectively, the regional and provincial seed coordinators should prepare the seed production and distribution plan in regional and provincial levels respectively. The following items will be included in a seed production and distribution plan :

1) seed production plan in the objective DA stations by season,
2) seed production plan of seed growers by season,
3) operation plan of seed processing and storage facilities in the DA stations and DA provincial offices introduced,
4) time schedule for seed procurement and distribution,
5) schedule for field inspection and seed testing,
6) recruitment and training plan for seed growers,
7) budget planning for seed production and distribution activities

Strengthening of monitoring and evaluation activities in provincial and regional levels will be indispensable for effective implementation of the Model Improvement Plans as well as formulation of a practical seed production and distribution plan. Monitoring and evaluation will be done by the regional seed coordinators, while the following institutes concerned should report the necessary information and data :

1) DA stations ;
   seed production, seed procurement and distribution, seed production cost
2) Provincial seed coordinators ;
   seed procurement from the DA stations to the provincial offices and seed distribution to seed growers, operation record of seed processing and storage facilities introduced, activities of seed growers(seed procurement, seed production, seed production cost, price of certified seed, stock of seed) through provincial seed growers associations/cooperatives, results on field inspections by field inspectors, activities of field inspectors, data on potential seed growers, extension of certified seed to commercial farmers

3) Regional seed testing laboratories ;
   results on seed testing, evaluation of field inspection, evaluation of seed quality(seed from stations and seed growers, buffer stock seed)

4) Operators/engineers for seed processing and storage facilities introduced ;
   operation record, seed stock, O&M cost of facilities

For the effective consolidation and evaluation of data and information collected, micro-computers should be introduced to the above institutes concerned. Data form will be uniformed and data processing time and mistake could be reduced. Improvement of communication activities among the institutes concerned including the BPI Manila will be effectively done using fax machine instead of present telephone or radio message. While the extension of telephone lines to the DA stations which have not been extended the lines will be required.

Table H.1.1 CERTIFIED RICE SEED PROCUREMENT BY INVESTMENT OUTLEY (1987 - 89)

Region	1987		1988		1989	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	50	280	60	335	66	441
II	48	265	59	325	64	429
III	92	510	131	725	113	750
IV	48	265	59	325	65	435
V	52	290	59	325	180	1,200
VI	50	275	59	325	64	429
VII	16	90	26	145	29	195
VIII	35	193	50	275	54	363
IX	18	100	27	150	81	540
X	14	80	27	150	30	198
XI	18	100	27	153	30	201
XII	18	100	27	153	30	201
BPI Central	930	5,168	837	4,650	698	4,650
CAR					16	105
Total	1,389	7,716	1,448	8,036	1,520	10,032

Table H.1.2 CERTIFIED CORN SEED PROCUREMENT BY INVESTMENT OUTLEY (1987 - 89)

Region	1987		1988		1989	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	4	95	5	150	5	169
II	11	260	13	394	13	429
III	3	85	4	131	3	98
IV	7	180	8	256	9	286
V	7	180	8	263	20	650
VI	8	190	8	256	9	293
VII	5	135	9	281	10	319
VIII	4	105	5	156	5	176
IX	4	105	8	250	9	299
X	7	180	9	281	10	319
XI	4	105	9	281	10	319
XII	4	105	9	281	10	319
BPI Central	53	1,320	8	239	10	312
CAR					5	176
Total	121	3,045	103	3,219	128	4,164

Table H.1.3 CERTIFIED LEGUMES SEED PROCUREMENT BY INVESTMENT OUTLEY (1987 - 89)

Region	1987		1988		1989	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	0.50	10	0.70	14	0.78	20
II	1.00	20	1.70	34	1.84	46
III	1.00	20	1.10	22	1.22	31
IV	0.75	15	0.35	7	0.52	13
V	0.50	10	0.60	12	0.09	2
VI	3.00	60	3.35	67	3.70	93
VII	1.00	20	1.75	35	1.82	46
VIII	0.50	10	0.75	15	0.82	21
IX	1.00	20	1.70	34	1.60	40
X	0.50	10	1.05	21	1.16	29
XI	0.50	10	1.15	23	1.26	32
XII	0.50	10	1.15	23	1.26	32
BPI Central	3.00	60	15.90	318	14.14	354
CAR					2.62	66
Total	13.75	275	31.25	625	30.21	759

Table H.1.4 INVESTMENT OUTLAY PLAN FOR CERTIFIED RICE SEED PROCUREMENT (1991 - 95)

Region	1991		1992		1993		1994		1995	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	117	1,200	122	1,296	126	1,400	131	1,595	135	1,800
II	50	506	54	576	59	650	63	770	68	900
III	72	736	77	816	81	900	86	1,045	90	1,200
IV	83	851	86	912	88	975	90	1,100	95	1,260
V	140	1,426	144	1,536	149	1,650	153	1,870	158	2,100
VI	50	506	54	576	59	650	63	770	68	900
VII	50	506	54	576	59	650	63	770	68	900
VIII	50	506	54	576	59	650	63	770	68	900
IX	59	600	63	672	68	750	72	880	77	1,020
X	39	396	39	418	40	440	40	490	41	540
XI	32	327	32	346	33	365	33	407	34	450
XII	32	331	33	355	34	380	35	429	36	480
BPI Central	203	2,070	207	2,208	216	2,400	225	2,750	234	3,120
CAR	34	350	35	370	35	390	36	435	36	480
Total	1,011	10,311	1,054	11,233	1,106	12,250	1,153	14,081	1,208	16,050

Table H.1.5 INVESTMENT OUTLAY PLAN FOR CERTIFIED CORN SEED PROCUREMENT (1991 - 95)

Region	1991		1992		1993		1994		1995	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	6	217	6	240	7	264	7	289	7	320
II	5	168	5	188	5	208	5	230	6	252
III	5	175	5	195	5	216	6	238	6	261
IV	6	203	6	225	6	248	6	272	7	297
V	13	455	13	495	13	536	14	578	14	621
VI	5	182	5	203	6	224	6	247	6	270
VII	5	182	5	203	6	224	6	247	6	270
VIII	5	161	5	480	5	200	5	221	5	243
IX	5	189	6	21	6	232	6	255	6	279
X	9	301	9	330	9	360	9	391	9	423
XI	8	257	8	315	9	344	9	374	9	405
XII	8	287	8	315	9	344	9	374	9	405
BPI Central	42	1,470	44	1,650	44	1,760	46	1,955	48	2,160
CAR	1	42	1	53	2	64	2	77	2	90
Total	123	4,289	126	4,913	132	5,224	136	5,748	140	6,296

Table H.1.6 INVESTMENT OUTLAY PLAN FOR CERTIFIED LEGUMES SEED PROCUREMENT (1991 - 95)

Region	1991		1992		1993		1994		1995	
	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)	Quantity (ton)	Amount (P'000)
I	0.81	24	0.82	29	0.83	33	0.84	38	0.85	42
II	0.18	5	0.19	7	0.20	8	0.21	9	0.22	11
III	0.57	17	0.58	20	0.59	24	0.60	27	0.61	30
IV	0.53	16	0.54	19	0.55	22	0.56	25	0.57	29
V	0.33	10	0.34	12	0.35	14	0.36	16	0.37	19
VI	0.41	12	0.42	15	0.43	17	0.44	20	0.45	23
VII	0.41	12	0.42	15	0.43	17	0.44	20	0.45	23
VIII	0.04	11	0.38	13	0.39	16	0.40	18	0.41	21
IX	0.41	12	0.41	15	0.42	17	0.43	19	0.44	22
X	0.41	12	0.42	15	0.43	17	0.44	20	0.45	23
XI	0.37	11	0.38	13	0.39	16	0.40	18	0.40	20
XII	0.37	11	0.38	13	0.39	16	0.40	18	0.41	20
BPI Central	1.85	56	2.00	70	2.10	84	2.20	99	2.30	115
CAR	0.16	5	0.17	6	0.18	7	0.19	9	0.20	10
Total	6.85	214	7.45	262	7.68	308	7.91	356	8.13	408

Table II.1.7 RICE BREEDER AND FOUNDATION SEED ALLOCATION FROM BPI MANILA TO STATIONS AND SEED FARMS

(Unit : kg)

Region	Experiment Station, Seed Farm	1986 Y		1987 Y		1988 Y		1989 Y		Average		
		Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Total
Breeder Seed												
Region I	Dingras Expt. Station	0	0	0	0	45	0	15	0	15	0	15
Region II	Cagayan Valley Expt. Station	60	45	100	45	0	45	60	60	55	49	104
	Abulog Seed Farm	90	45	225	0	35	0	0	0	88	11	99
Region III	PhilRice Central Expt. Station	240	270	264	270	0	120	75	0	145	165	310
Region IV	Mindro Horticultural Center	0	0	40	0	0	0	0	0	10	0	10
Region V	Bicol Expt. Station	105	0	286	120	0	90	90	130	120	85	205
Region VI	Visayas Expt. Station	105	30	105	105	90	65	90	75	98	69	167
	La Granja NCC	0	0	0	0	120	80	0	0	30	20	50
Region VII	Mandaue Expt. Station	0	0	0	0	0	35	0	0	0	9	9
Region VIII	Romualdez Expt. Station	0	0	0	0	0	0	0	0	0	0	0
Region X	Dalwangan Expt. Station	0	0	0	0	0	0	40	0	10	0	10
	Bukidnon Seed farm	0	0	0	0	0	20	0	0	0	5	5
Region XII	Mindanao Expt. Station	0	105	165	120	120	0	80	70	91	74	165
	Total	600	495	1,185	660	410	455	450	335	662	487	1,149
Foundation Seed												
Region I	Dingras Expt. Station	90	90	0	90	90	0	0	0	45	45	90
Region II	Ilagan Expt. Station	0	0	0	0	0	0	90	0	23	0	23
	Cagayan Valley Expt. Station	0	0	900	225	270	0	0	0	293	56	349
	Abulog Seed Farm	135	90	180	45	135	0	90	45	135	45	180
Region III	PhilRice Central Expt. Station	0	0	365	85	315	0	0	0	170	21	191
Region IV	Dr M.L. Roxas Memorial Expt.	0	0	70	20	0	0	0	0	18	5	23
	Mindro Horticultural Center	720	90	145	35	0	45	585	180	363	88	451
	Tanay Seed Farm	0	0	0	0	90	0	0	0	23	0	23
						(45)				(11)		(11)
	Palawan Seed Farm	0	0	0	45	0	0	0	0	0	11	11
Region V	Bicol Expt. Station	135	135	290	70	355	225	0	0	195	108	303
						(45)				(11)		(11)
	Daet Seed Farm	0	0	64	0	0	0	0	0	16	0	16
	Virac Seed Farm	0	0	45	0	0	0	0	0	11	0	11
Region VI	La Granja NCC	0	0	110	25	180	0	0	0	73	6	79
Region VII	Bohol Expt. Station	90	0	70	20	0	0	0	0	40	5	45
Region VIII	Romualdez Expt. Station	0	0	45	0	0	0	0	0	11	0	11
	Gandara Seed Farm	90	0	0	0	0	0	60	0	38	0	38
	Salcedo Seed Farm	0	0	45	0	0	0	0	0	11	0	11
Region IX	Ipil Expt. Station	270	0	110	25	135	90	45	0	140	29	169
Region X	Dalwangan Expt. Station	0	0	70	20	0	0	0	0	18	5	23
	Bukidnon Seed Farm	0	0	45	0	0	0	0	0	11	0	11
Region XI	Davao NCC	15	0	0	20	45	0	0	0	15	5	20
	Tupi Expt. Station	75	0	70	20	0	0	45	0	48	5	53
Region XII	Mindanao Expt. Station	0	0	220	50	0	0	0	0	55	13	68
	Total	1,620	405	2,844	795	1,705	360	915	225	1,774	447	2,221

Note : ( ) ; Upland paddy
Source : BPI Malate

Table II.1.8 CORN FOUNDATION SEED ALLOCATION
FROM BPI MANILA TO STATIONS AND SEED FARMS

(Unit : kg)

Region	Experiment Station, Seed Farm	1986 Y		1987 Y		1988 Y		1989 Y		Average		
		Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Total
Region II	Ilagan Expt. Station	0	0	0	0	0	20	0	40	0	15	15
	Abulug Seed Farm	100	0	100	0	0	0	0	150	50	38	88
Region IV	Economic Garden NCC	0	0	0	0	0	40	0	0	0	10	10
	Dr M.L. Roxas Expt. Station	0	100	100	0	0	0	0	0	25	25	50
	Mindro Horticultural Center	0	0	0	0	0	50	0	0	0	13	13
	Tanay Seed farm	220	0	0	0	0	50	0	0	55	13	68
	Palawan Seed farm	0	0	70	20	60	0	0	0	33	5	38
Region V	Bicol Expt. Station	0	0	0	0	0	745	0	152	0	224	224
	Albay Expt. Station	0	50	20	0	0	0	0	0	5	13	18
	Daet Seed Farm	0	0	0	150	0	0	0	20	0	43	43
	Virac Seed Farm	0	0	0	50	0	0	0	0	0	13	13
Region VI	La Granja NCC	0	0	0	60	0	0	0	0	0	15	15
Region VII	Mandaue Expt. Station	0	45	0	0	0	0	0	0	0	11	11
	Bohol Expt. Station	100	0	0	0	0	60	0	0	25	15	40
Region VIII	Romualdez Expt. Station	0	0	0	0	0	75	0	0	0	19	19
	Bbuyog Expt. Station	0	0	0	0	0	0	0	40	0	10	10
	Gandara Seed Farm	0	50	0	0	0	65	0	50	0	41	41
Region IX	Ipil Expt. Station	50	0	0	30	0	20	0	100	13	38	51
Region X	Dalwangan Expt. Station	150	0	0	0	0	0	0	0	38	0	38
	Bukidnon Seed farm	0	0	0	150	0	100	0	43	0	73	73
Region XI	Davao NCC	0	0	20	0	0	0	0	40	5	10	15
	Tupi Expt. Station	0	0	40	0	0	0	0	0	10	0	10
Region XII	Aroman Seed Farm	0	0	0	100	0	50	0	0	0	38	38
	Kidapawan-Amas Complex	0	520	0	0	0	50	0	0	0	143	143
	Total	620	765	350	560	60	1,325	0	635	259	825	1,084

Source : BPI Malate

Table H.1.9 PEANUT BREEDER AND FOUNDATION SEED ALLOCATION
FROM BPI MANILA TO STATIONS AND SEED FARMS

(Unit : kg)

Region	Experiment Station, Seed Farm	1986 Y		1987 Y		1988 Y		1989 Y		Average		
		Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Wet S	Dry S	Total
Breeder Seed												
Region II	Ilagan Expt. Station	0	0	0	25	0	0	0	22	0	12	12
	Abulug Seed Farm	0	0	0	0	0	0	0	30	0	8	8
Region VI	La Granja NCC	0	0	0	44	0	0	0	80	0	31	31
Region X	Dalwangan Expt. Station	0	0	0	20	0	0	72	0	18	5	23
Region XI	Davao NCC	0	0	0	17	0	0	0	0	0	4	4
	Total	0	0	0	106	0	0	72	132	18	60	78
Foundation Seed												
Region I	Dingras Expt. Station	-	-	-	-	0	37	0	0	0	18	18
Region IV	Palawan Seed Farm	-	-	-	-	0	34	0	0	0	17	17
Region VI	La Granja NCC	-	-	-	-	0	51	0	0	0	26	26
	Total	-	-	-	-	0	122	0	0	0	61	61

Source : BPI Malate

Table H.1.10 SEED DISTRIBUTION COST FROM BPI HEAD OFFICE

Island/ Region	Destination Province	City/Municipality	Per Sack (40 kg)	Per kg
Luzon				
Bocol	Camarines Sur	Pili	200	5.00
	Camarines Norte	Daet	200	5.00
	Catanduanes	Virac	300	7.50
CAR	Benguet	Baguio	250	6.25
Central Luzon	Nueva Ecija	Munos	200	5.00
Cagayan Valley	Cagayan	Tuguegarao	300	7.50
	Isabela	San Mateo	250	6.25
		Ilagan	300	7.50
	Quirino	Cabaroguis	250	6.25
Ilocos	Ilocos Norte	Dingras	300	7.50
Mindoro				
Southern Tagalog	Occidental Mindoro	San Jose	200	5.00
Visayas				
Western Visayas	Iloilo	Iloilo City	150	3.75
		Santa Barbara	200	5.00
		Jordan(Guimaras)	300	7.50
	Negros Occidental	La Carlota	200	5.00
Central Visayas	Cebu	Cebu City	150	3.75
		Mandaue	200	5.00
	Bohol	Ubay	250	6.25
Leyte				
Eastern Visayas	Leyte	Tacloban	150	3.75
Mindanao				
Western Mindanao	Zamboanga del Sur	Zamboanga City	260	6.50
		Ipil	300	7.50
Nortern Mindanao	Misamis Oriental	Cagayan de Oro	260	6.50
	Bukidnon	Kibawe	300	7.50
Southern Mindanao	Davao City	Davao City	260	6.50
Central Mindanao	Maguindanao	Cotabato City	260	6.50

Note : The rates based on the door to door delivery using boat and land transportation.
Source : Petal Cargo Express Company

Table H.4.1 PEANUT SEED PROCUREMENT AND DISTRIBUTION *IN ILAGAN EXPERIMENT STATION*

1. Peanut Seed Procurement

Year	Procurement of Breeder Seed			Procurement of Foundation Seed		
	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season
1986	-	-	-	-	-	-
1987	BPI Manila	-	25	UPLB	-	10
1988	-	-	-	-	-	-
1989	UPLB	-	300	-	-	-
1990	BPI, Manila	-	20	-	-	-

2. Peanut Seed Distribution

Year	Distribution of Foundation Seed			Distribution of Registered Seed			Distribution of Certified Seed		
	Destination	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season
1986	-	-	-	-	-	-	-	-	-
1987	-	-	-	Farmers(Quirino)	520	-	DA/Program	1,200	2,200
				Farmers(Isabela)	10	-	BPI, Manila	-	1,000
1988	-	-	-	Farmers(Quirino, Isabela)	40	190	DA/Program	-	580
							Farmers(Quirino)	-	80
				DA/Program	-	450			
1989	Farmers(Isabela)	-	240	Farmers(Quirini, Isabela)	1,100	-	Farmers(Quirino, Isabela)	-	3,000
	BPI, Manila		540						
1990	DA Program*	-	1,700	-	-	-	DA/Program	-	2,440
							Farmers(Quirino, Isabela)	-	620

* ; Peanut Action Project, Region II

3. *Quantity of Peanut Seed Stock*

Month/ Year	Foundation Seed (kg)			Registered Seed (kg)			Certified Seed (kg)		
	1987	1988	1989	1987	1988	1989	1987	1988	1989
Jan	-	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-	-
Mar	-	-	-	-	-	-	-	-	-
Apr	-	-	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-	130	2,960
Jun	-	-	900	-	-	-	-	-	800
Jul	-	-	300	-	-	-	-	-	-
Aug	-	-	-	-	-	-	-	-	-
Sep	-	-	-	-	-	-	-	-	-
Oct	-	-	-	-	-	-	-	-	-
Nov	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-

Table H.4.2 RICE SEED PROCUREMENT AND DISTRIBUTION IN VISAYAS EXPERIMENT STATION

1. Rice Seed Procurement

Year	Procurement of Breeder Seed			Procurement of Foundation Seed		
	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season
1986	BPI Manila	105	30	-	-	-
1987	BPI Manila	180	55	-	-	-
1988	BPI Manila	135	-	-	-	-
1989	BPI Manila	120	105	-	-	-
1990						

2. Rice Seed Distribution

Year	Distribution of Foundation Seed			Distribution of Registered Seed/_1			Distribution of Certified Seed		
	Destination	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season
1986	BPI Manila	270	90	Other Regions	675	225	Region VI	1,800	230
	Region VIII	180	45	Region VI	17,194	5,729			
	Region XI	540	180	Total	17,869	5,954			
	sub-total	990	315						
	Region VI	3,079	1,027						
	Total	4,069	1,342						
1987	Region XI	135	45	Other Regions	2295	765	Region VI	14,090	7,700
	Region VI	3,438	1,147	Region VI	32,984	10,996			
	Total	3,573	1,192	Total	35,279	11,761			
1988	BPI Manila	45	0	Other Regions	675	225	Region VI	11,160	3,720
	Region VII	45	0	Region VI	17,185	5,729			
	Region VIII	135	0	Total	17,860	5,954			
	Region IX	371	124						
	Region XI	90	0						
	sub-total	686	124						
	Region VI	2,262	754						
	Total	2,948	878						
1989	Region V	25	0	Other Regions	769	257	Region VI	1,080	360
	Region VII	303	102	Region VI	32,984	10,996			
	Region VIII	270	90	Total	33,753	11,253			
	Region IX	270	90						
	Region XI	45	0						
	sub-total	913	282						
	Region VI	4,290	1,430						
	Total	5,203	1,712						
1990	Region VII	67	23	Other Regions	3,543	1,182	-	-	-
	Region IX	303	102	Region VI	8,381	2,780			
	Region XI	168	57	Total	11,924	3,962			
	sub-total	538	182						
	Region VI	807	-						
	Total	1,345	182						

Note : /_1 ; Included registered seed from seed growers

3. Quantity of Rice Seed Stock

Month/ Year	Foundation Seed (kg)				
	1987	1988	1989	Average	Index
Jan	2,655	4,815	3,015	3,495	97
Feb	2,880	4,995	3,870	3,915	109
Mar	2,070	8,100	4,230	4,800	133
Apr	2,070	8,460	7,785	6,105	170
May	3,555	8,145	11,205	7,635	212
Jun	2,295	5,265	7,065	4,875	135
Jul	1,935	4,545	4,320	3,600	100
Aug	1,755	4,365	3,240	3,120	87
Sep	1,080	2,295	2,340	1,905	53
Oct	945	1,665	1,845	1,485	41
Nov	675	1,665	1,575	1,305	36
Dec	540	1,485	765	930	26
Average	1,871	4,650	4,271	3,598	100

Month/ Year	Registered Seed (kg)				
	1987	1988	1989	Average	Index
Jan	3,015	21,645	15,615	13,425	127
Feb	5,175	32,985	10,800	16,320	154
Mar	8,505	33,705	12,420	18,210	172
Apr	9,405	30,105	8,640	16,050	152
May	8,775	24,930	9,990	14,565	138
Jun	1,440	23,355	6,165	10,320	97
Jul	4,860	21,510	2,250	9,540	90
Aug	4,365	12,330	1,530	6,075	57
Sep	585	8,910	1,350	3,615	34
Oct	0	5,175	4,545	3,240	31
Nov	9,495	10,890	5,535	8,640	82
Dec	8,505	6,165	6,525	7,065	67
Average	5,344	19,309	7,114	10,589	100

Month/ Year	Certified Seed (kg)				
	1987	1988	1989	Average	Index
Jan	630	0	585	405	22
Feb	3,690	2,520	0	2,070	114
Mar	4,455	5,400	630	3,495	193
Apr	7,605	3,510	630	3,915	216
May	4,905	2,565	630	2,700	149
Jun	3,690	2,295	1,620	2,535	140
Jul	2,115	2,115	1,125	1,785	98
Aug	1,755	2,115	810	1,560	86
Sep	1,530	2,115	810	1,485	82
Oct	495	1,800	810	1,035	57
Nov	315	1,800	0	705	39
Dec	225	45	0	90	5
Average	2,618	2,190	638	1,815	100

Table H.4.3 CORN SEED PROCUREMENT AND DISTRIBUTION IN DAVAO EXPERIMENT STATION

1. Corn Seed Procurement

Year	Procurement of Breeder Seed			Procurement of Foundation Seed		
	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season	Source (Name of Station	Quantity (kg) Wet Season	Dry Season
1986	IPB, Los Banos	20	20	BPI	20	20
1987	Economic Garden	60	60	-	-	-
1988	IPB, Los Banos	20	20	-	-	-
1989	IPB, Los Banos	20	20	IPB, Los Banos	25	25
1990	IPB, Los Banos	20	20	BPI	20	20

2. Corn Seed Distribution

Year	Distribution of Foundation Seed			Distribution of Registered Seed			Distribution of Certified Seed		
	Destination (Name of Station)	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season	Destinatior	Quantity (kg) Wet Season	Dry Season
1986	-	-	-	Region VIII*	300	300	Region XI	1,940	1,940
				Region X*	300	300	(Farmers)		
				sub-total	600	600			
				Region XI /_1	300	300			
				Total	900	900			
1987	-	-	-	Region X*	760	760	Region XI	2,240	2,240
				Region XI	1,440	1,440	(Farmers)		
				Total	2,200	2,200			
1988	-	-	-	Region XI /_1	620	620	-	-	-
1989	-	-	-	BPI Manila	1,350	1350	-	-	-
				Region X*	1,360	1,360			
				sub-total	2,710	2,710			
				Region XI /_1	1,500	1,500			
				Total	4,210	4,210			
1990	-	-	-	Region XII	1,650	1,650	-	-	-
				Region XI /_1	3,300	3,000			
				Total	4,950	4,650			

Note : * ; Regional Office, /_1 ; Tupi Seed Farm and seed growers

3. Quantity of Corn Seed Stock

Month/ Year	Foundation Seed (kg)			Registered Seed (kg)			Certified Seed (kg)		
	1987	1988	1989	1987	1988	1989	1987	1988	1989
Jan	-	-	-	-	-	-	-	-	-
Feb	-	-	-	-	-	-	-	-	-
Mar	-	-	-	-	-	-	-	-	-
Apr	-	-	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-	-	-
Jun	-	-	-	-	-	-	-	-	-
Jul	-	-	-	-	-	-	-	-	-
Aug	-	-	-	-	-	-	-	-	-
Sep	-	-	-	-	-	-	-	-	-
Oct	-	-	-	-	-	-	-	-	-
Nov	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-

Table II.4.4 CORN SEED PROCUREMENT AND DISTRIBUTION IN TUPI SEED FARM

1. Corn Seed Procurement (Tupi Seed Farm)

Year	Procurement of Breeder Seed			Procurement of Foundation Seed		
	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season	Source (Name of Station)	Quantity (kg) Wet Season	Dry Season
1986	-	-	-	-	-	-
1987	-	-	-	-	-	-
1988	IPB, Los Banos	10	-	BPI	-	5
1989	IPB, Los Banos	10	-	BPI	-	10
1990	-	-	-	-	-	-

2. Corn Seed Distribution (Tupi Seed Farm)

Year	Distribution of Foundation Seed			Distribution of Registered Seed			Distribution of Certified Seed		
	Destination (Name of Station)	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season	Destination	Quantity (kg) Wet Season	Dry Season
1986	-	-	-	Region XI (Seed growers)	7,100	6,110	-	-	-
1987	-	-	-	Region XI (Seed growers)	6,380	3,920	-	-	-
1988	Region XI (Seed growers)	1,350	-	Region XI (Seed growers)	5,220	2,880	-	-	-
1989	Region XI (Seed growers)	1,125	-	Region XI (Seed growers)	15,410	6,450	Region XI (Farmers)	2,440	-
1990	-	-	-	-	-	-	-	-	-

3. Quantity of Corn Seed Stock (Tupi Seed Farm)

Month/ Year	Foundation Seed (kg)		
	1987	1988	1989
Jan	0	0	0
Feb	0	0	0
Mar	0	0	0
Apr	0	0	0
May	0	0	0
Jun	0	0	0
Jul	0	0	0
Aug	0	2,340	0
Sep	0	0	0
Oct	0	0	1,980
Nov	0	0	0
Dec	0	0	0

Month/ Year	Registered Seed (kg)				
	1987	1988	1989	Average	Index
Jan	0	5,850	0	1,950	118
Feb	2,300	0	0	767	46
Mar	2,480	1,530	810	1,607	97
Apr	1,580	0	0	527	32
May	0	1,530	0	510	31
Jun	0	800	1,490	763	46
Jul	0	0	3,240	1,080	65
Aug	1,400	0	0	467	28
Sep	860	720	6,750	2,777	168
Oct	3,100	0	0	1,033	62
Nov	2,030	3,920	4,905	3,618	218
Dec	0	8,590	5,720	4,770	288
Average	1,146	1,912	1,910	1,656	100

Month/ Year	Certified Seed (kg)		
	1987	1988	1989
Jan	0	1,097	0
Feb	0	0	0
Mar	0	0	0
Apr	0	0	2,475
May	0	0	0
Jun	0	0	0
Jul	0	0	0
Aug	0	0	0
Sep	0	0	0
Oct	0	0	0
Nov	0	0	0
Dec	0	1,665	0

Table H.4.5 STATIONS' SEED PROCUREMENT AND DISTRIBUTION ACTIVITIES IN THE MODEL AREAS

Item	Peanut Seed	Rice Seed	Corn Seed	
	Ilagan E.S	Visayas E.S	Davao NCC	Tupi S.F
I. Procurement of Seed				
1. Breeder Seed				
– Season	Dry	Wet & Dry	Wet & Dry	Wet
– Frequency	3 times/5 years	7 times/4 years	10 times/5 years	4 times/4 years
– Quantity (average in procured years)	120 kg	180 kg	56 kg	10 kg
2. Foundation Seed				
– Season	Dry	–	Wet & Dry	Dry
– Frequency (times in 5 years)	1 time/5 years	–	6 times/5 years	2 stimes/4 years
– Quantity (average in procured years)	10 kg	–	43 kg	8 kg
II. Distribution of Seed				
1. Foundation Seed				
– Season	Dry	Wet & Dry	–	Wet
– Frequency	2 seasons/5 years	10 seasons/5 years	–	2 seasons/4 years
– Quantity (average in 4-5 years)	500 kg	4,480 kg	–	620 kg
– Destination	DA (69%) BPI (22%) Region II (22%)	BPI (2%) Other Region (17%) Region VI (81%)	–	Region XI (100%)
2. Registered Seed				
– Season	Wet & Dry	Wet & Dry	Wet & Dry	Wet & Dry
– Frequency	3 seasons/5 years	10 seasons/5 years	10 seasons/5 years	8 seasons/4 years
– Quantity	460 kg	31,100 kg	5,090 kg	13,370 kg
– Destination	DA* (19%) Region II (81%)	Other Region (7%) Region VI (93%)	Other Region (45%) Region XI (55%)	Region XI (100%)
3. Certified Seed				
– Season	Wet & Dry	Wet & Dry	Wet & Dry	Wet
– Frequency	4 seasons/5 years	8 seasons/4 years	4 seasons/5 years	1 season/4 years
– Quantity	2,200 kg	10,040 kg	1,670 kg	610 kg
– Destination	DA* (58%) BPI (9%) Region II (33%)	Region VI (100%)	Region XI (100%)	Region XI (100%)
III. Seed Storage				
1. Kind of Seed	F.S, C.S	F.S, R.S, C.S	–	F.S, R.S, C.S
2. Month Stored				
– Wet season harvest	–	Feb. - July	–	Aug. - Jan.
– Dry season harvset	May - July (2 months)	Aug. - Jan. (6 months)	–	Feb. - Jul. (6 months)
3. Quantity Stored (t)				
– F.S	0 - 0.9	0.5 - 11.2	–	0 - 2.3
– R.S	–	0 - 33.7	–	0 - 8.5
– C.S	0 - 3.0	0 - 7.6	–	0 - 2.5

Note: *; Crop production programs under the DA.
Source: JICA Questionnaire Survey to Stations and Seed Farms

Table H.4.6 SEED MARKETING ACTIVITIES BY SEED GROWERS IN THE MODEL AREAS

Item	Region II (Peanut Seed)	Region XI (Corn Seed)		Region VI (Rice Seed)	
I. Sampling Site	Quirino	Iloilo, Aklan,		South Cotabato,	
1. Province	(Madela)	Capiz, Guimaras		Davao City,	
				Davao Oriental	
II. Procurement of Seed					
1. Source					
– Foundation Seed	Ilagan E.S	Visayas E.S		Tepi S.F, DA Regional Office	
– Registered Seed	Ilagan E.S	Visayas E.S, Seed Farmers		Davao NCC, Tupi S.F, DA Regional Office	
2. No. of days before planting	11 days (7 - 15 days)	22 days (5 - 60 days)		19 days (5 - 30 days)	
III. Seed Marketing	Dry S.	Wet S.	Dry S.	Wet S.	Dry S.
1. Sold as seed (%)	58	82	76	65	64
– Cooperatives	(43)	(–)	(–)	(14)	(14)
– Middleman	(15)	(8)	(4)	(10)	(10)
– Farmers	(–)	(17)	(28)	(38)	(38)
– Government (DA)	(–)	(57)	(44)	(3)	(2)
2. Home use, others (%)	42	18	24	35	36
Total	100	100	100	100	100
3. No of days sold after processing	20 days (7-30 days)	37 days (5-60 days)	41 days (15-60 days)	31 days (5-40 days)	27 days (10-40 days)
IV. Seed Storage					
1. Period (days)	Dry S.	Wet S.	Dry S.	Wet S.	Dry S.
– Longest	60	180	180	60	60
– Shortest	7	5	7	5	7
– Average	26	67	66	28	31
2. Storage quantity (%) to total product	37	32	41	47	47

Source : JICA Questionnaire Survey

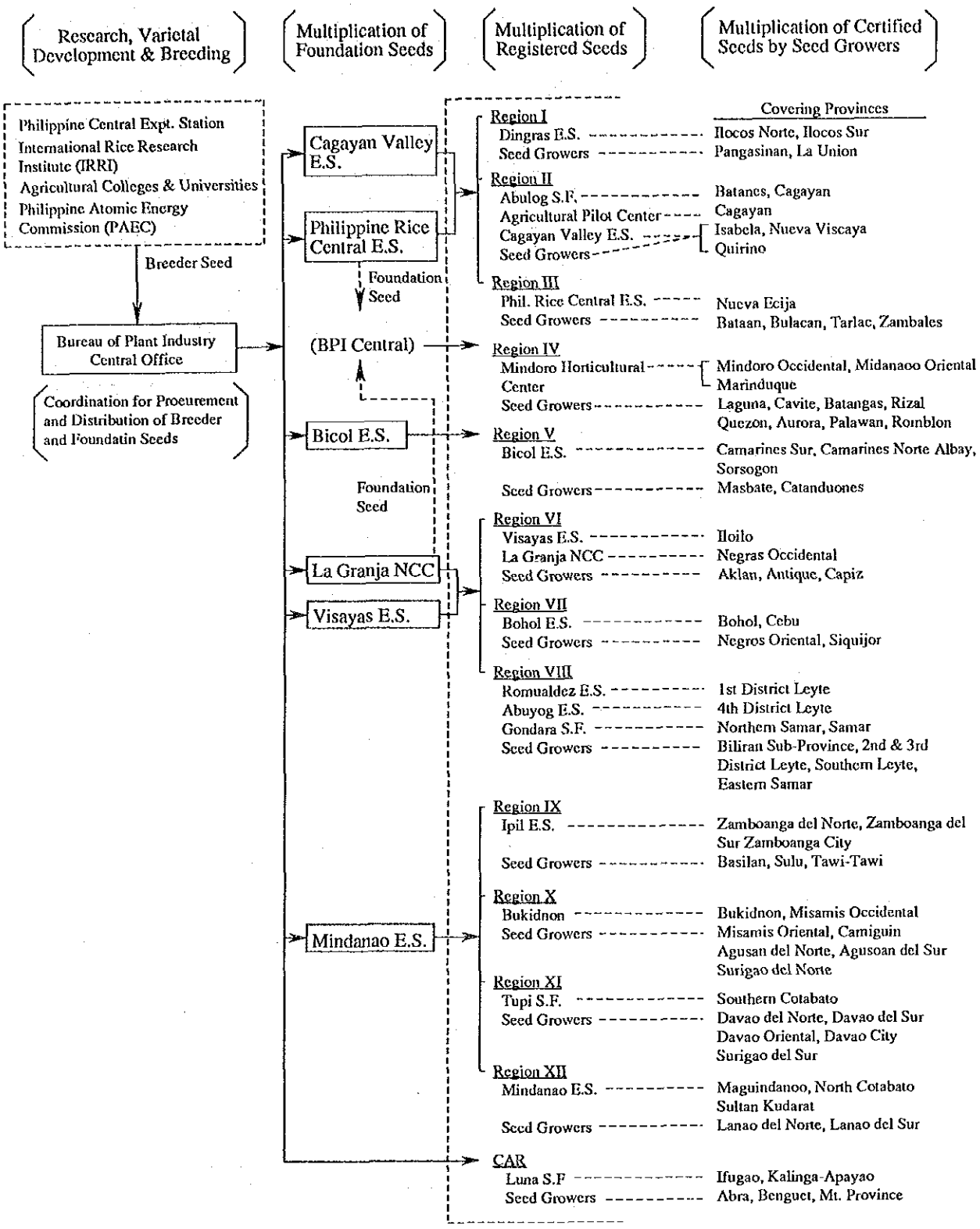

Fig. H.1.1 PRESENT RICE SEED PRODUCTION AND DISTRIBUTION SYSTEM

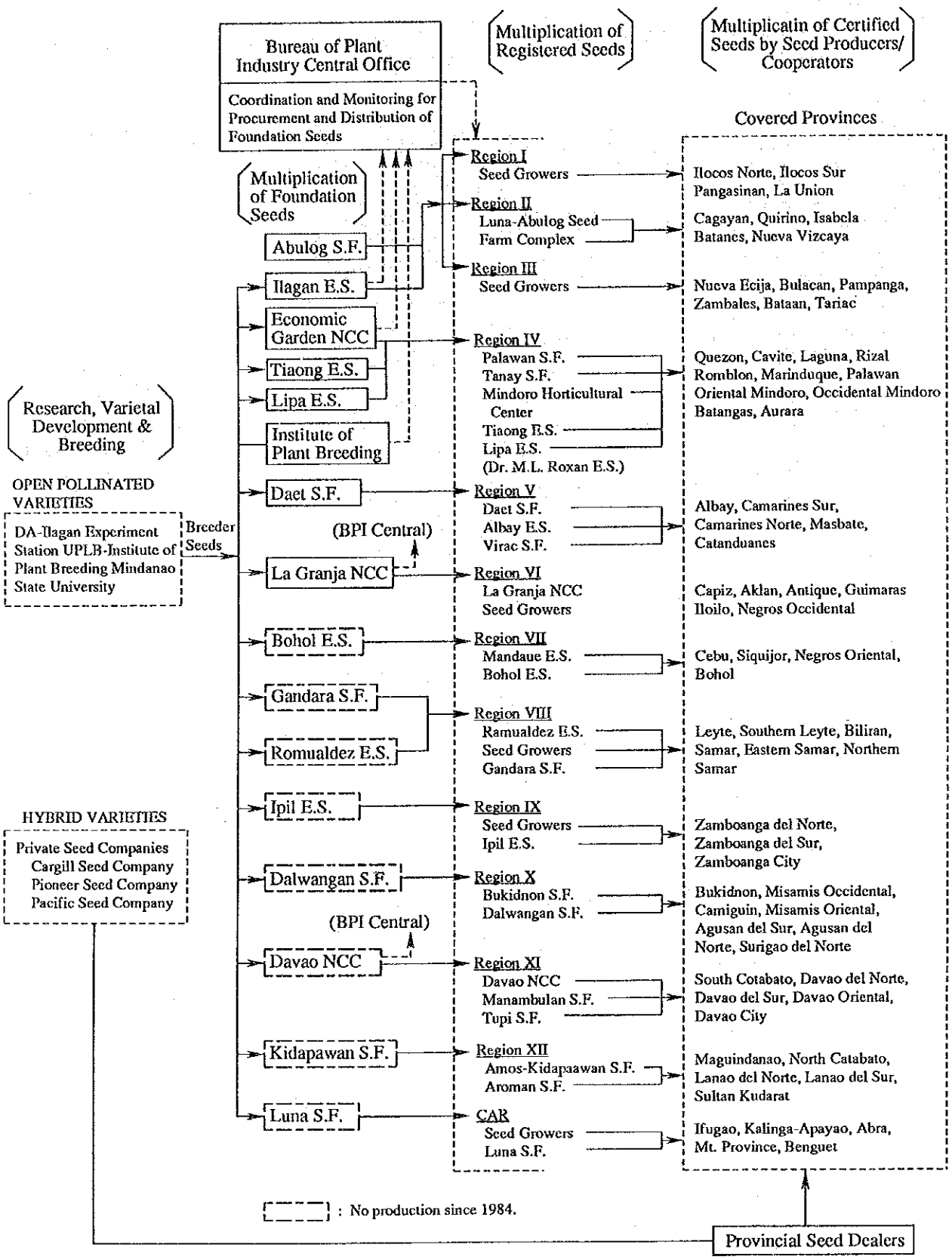

Fig H.1.2 PRESENT CORN SEED PRODUCTION AND DISTRIBUTION SYSTEM

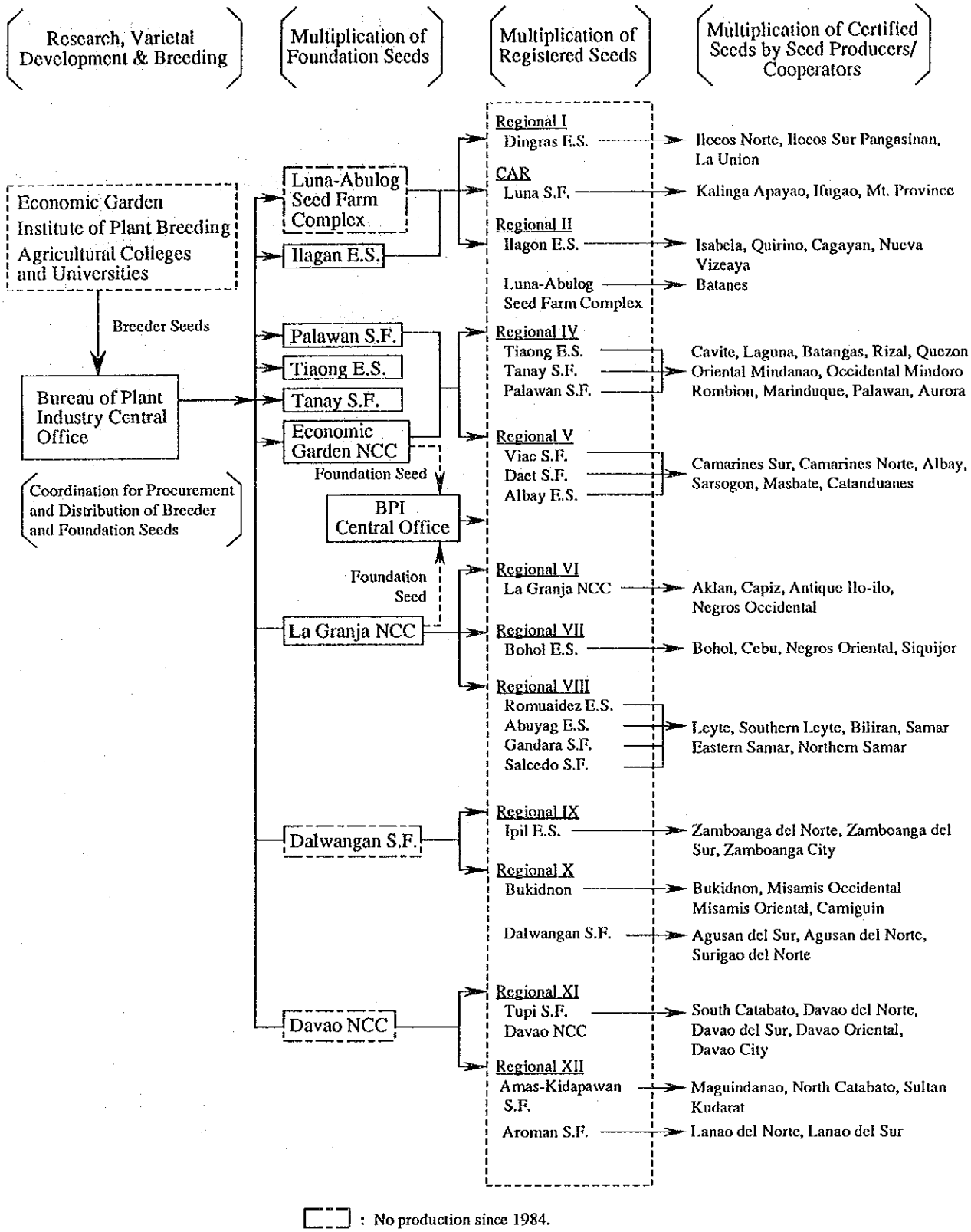

Fig. H.1.3 PRESENT PEANUT SEED PRODUCTION AND DISTRIBUTION SYSTEM

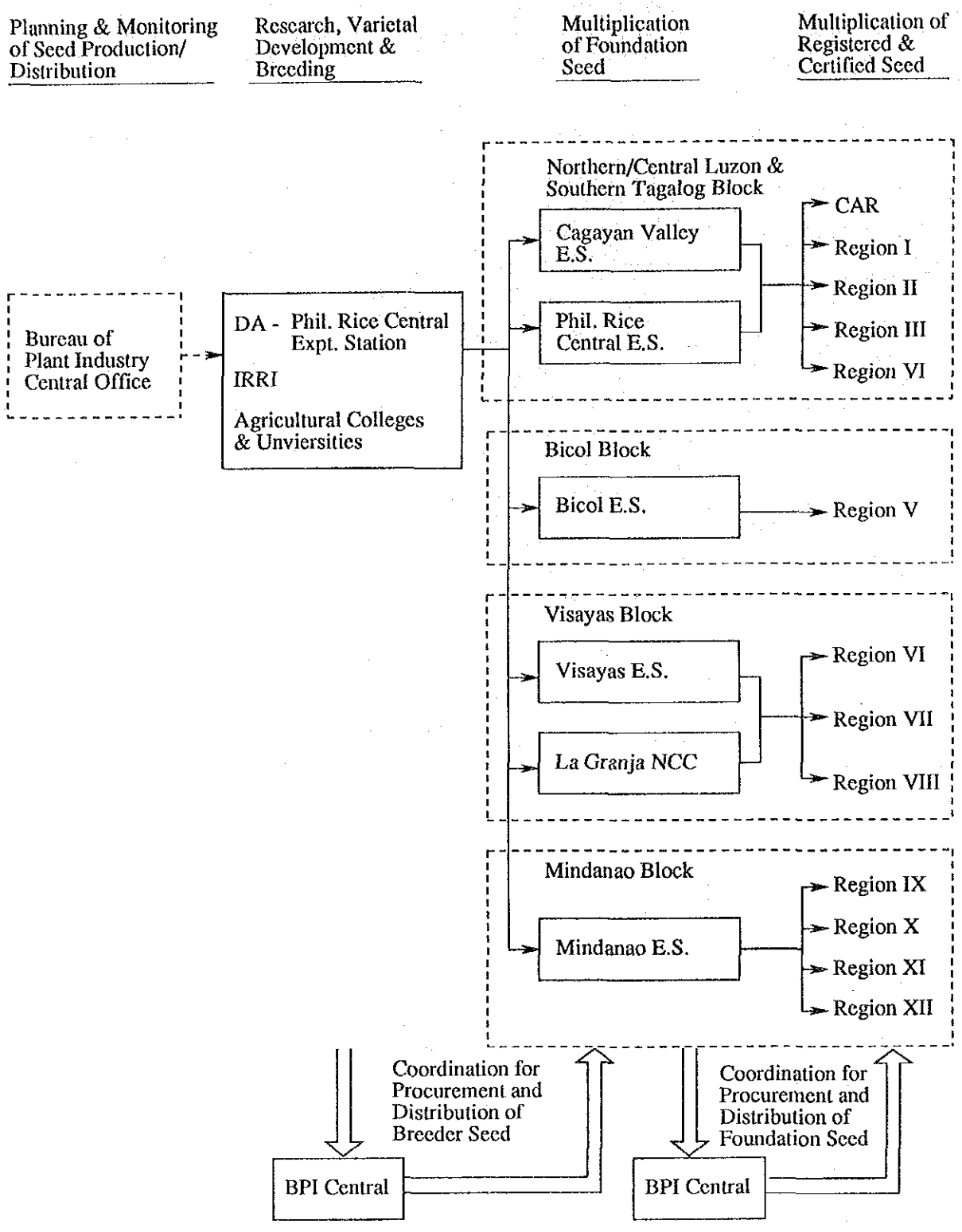

Fig. H.3.1 PROPOSED RICE SEED DISTRIBUTION SYSTEM