BASIC DESIGN STUDY REPORT

FOR

INCREASED FOOD PRODUCTION PROGRAM

IN

REPUBLIC OF THE PHILIPPINES

JANUARY 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on the Increased Food Production Project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to the Philippines the study team headed by Mr. Takenori YAMAZAKI, Assistant Director of Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs from October 22 to November 8 1985.

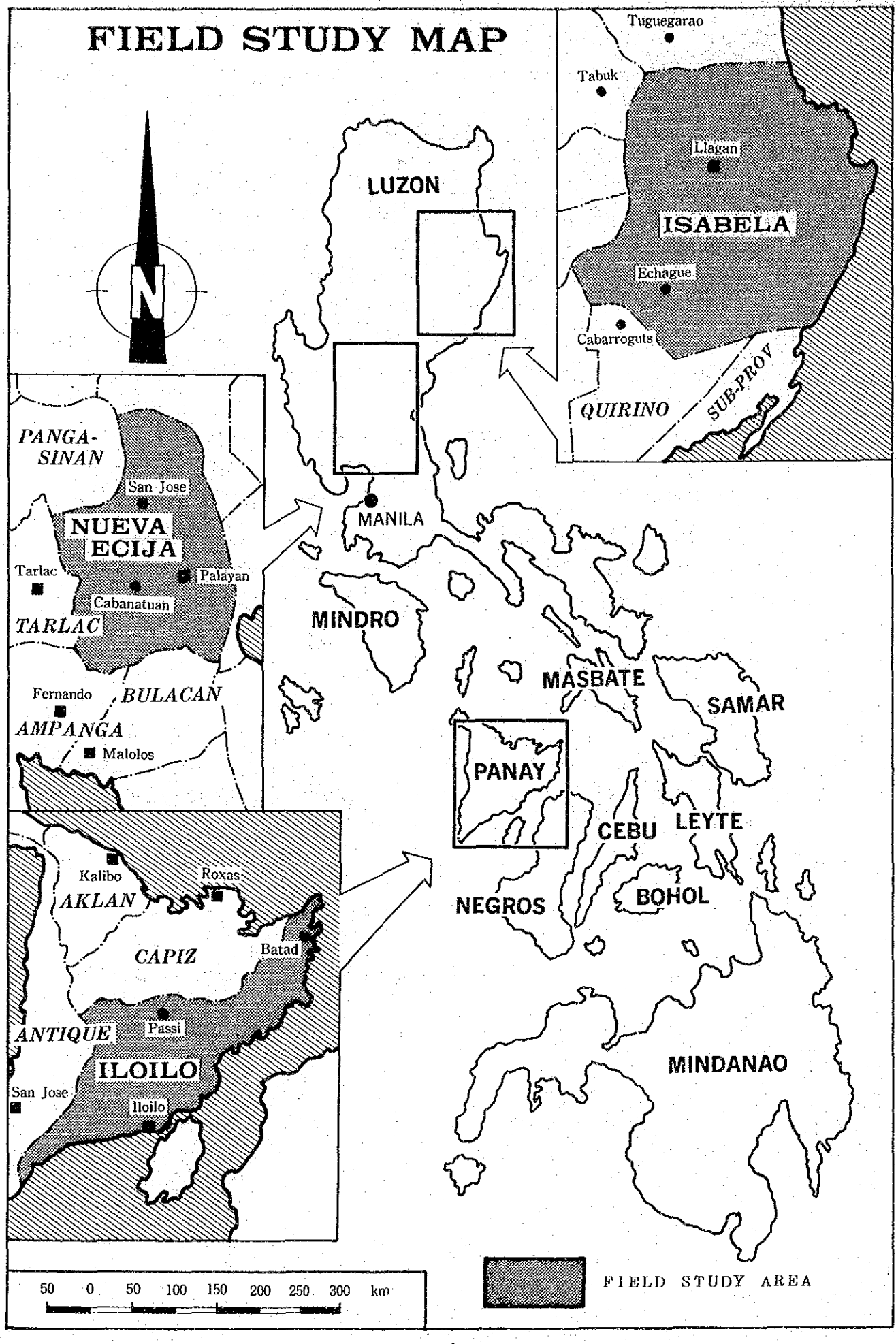
The team had discussions with the officials concerned of the Government of the Philippines and conducted a field survey in Panay and Nueva Ecija areas. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between the two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Philippines for their close cooperation extended to the team.

January, 1986.

Keisuke Arita
President
Japan International Cooperation Agency


FIELD STUDY MAP
N
LUZON
Tuguegarao
Tabuk
Llagan
ISABELA
Echague
Cabarroguts
QUIRINO
SUB-PROV
MANILA
PANGA-
SINAN
San Jose
NUEVA
ECIJA
Tarlac
Palayan
Cabanatuan
TARLAC
Fernando
BULACAN
AMPANGA
Malolos
MINDRO
MASBATE
SAMAR
PANAY
CEBU
LEYTE
NEGROS
BOHOL
MINDANAO
Kalibo
Roxas
AKLAN
CAPIZ
Batad
ANTIQUE
Passi
ILOILO
San Jose
Iloilo
50 0 50 100 150 200 250 300 km
FIELD STUDY AREA

SUMMARY

Although the Philippines achieved self-sufficient rice supply in the latter half of the 1970s, the economic situation subsequently was adversely affected by the oil shock and over investment in the manufacturing and mining industry. In the early 1980s, the economic situation was further aggravated by consecutive natural disasters resulting in substantial reductions in agricultural production and renewed reliance on import of staple food stuffs such as corn and rice in 1984. The worsening economic conditions also gave rise to a shortage of foreign currency and steep inflation in the cost of farm inputs, particularly fertilizers, agricultural chemicals and farm machinery. Thus, despite increases in irrigated area, agricultural production decreased.

The Government of Japan began the Increased Food Production Program in 1977 to support indigenous efforts in developing countries to achieve self-sufficient food production. A total of ¥16 billion has been contributed to the Philippines under this Program from 1977 to 1984.

In August 1985 the Government of the Philippines requested grant aid for 1985 under Japan's Increased Food Production Program. In response, the Government of Japan dispatched a Basic Design Study Mission led by Mr. T. Yamazaki, Deputy Director, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs. The Mission undertook the basic design study from 22 October to 8 November 1985. The objectives of the Mission were to:

a) study the content of the Philippine Government's request for assistance under the Program;

b) evaluate past contributions made to the Philippines under the Program; and

c) study possible improvements of the Program in the Philippines.

The results of the Study are summarized hereunder.

(1) Content of the Request

The Government of the Philippines is presently implementing the Revised Five Year Development Plan (1984-1987) which aims to increase the productivity of the agricultural sector and improve the standard of living. The Five Year Agricultural Development Plan (1984-1987), as one part of the above plan, is aiming to improve productivity, increase employment opportunities, achieve self-sufficient food supply and reduce imports of agricultural products. In order to realize these aims, particularly increased production of the staple foods, rice and corn, the Government of the Philippines is requesting provision of fertilizers, agricultural chemicals, construction equipment, grain driers and rice mills by the Government of Japan. Government agencies within the Philippines which will utilize the above are the National Food and Agriculture Council (NFAC), the National Food Authority (NFA) and the National Irrigation Administration (NIA).

The requested items are envisioned to have a substantial impact on agricultural production. The amounts of fertilizer and agricultural chemicals requested represent about 5% and 7%, respectively of the total amounts consumed in rice cultivation and are envisioned to result in a production increase equivalent to about 58,000t of milled rice. As the benefit/cost ratio of fertilizers and agricultural chemicals is 1.3, the production value is anticipated to exceed the cost. Agricultural machinery will be used for construction of farm canals and dredging (bulldozers and wheel loaders), as well as canal construction, road repair and maintenance (graders), thereby contributing to establishment of the production base for food crops. Machinery which indirectly contribute to increased food production such as rice mills, grain driers, and grain warehouses are also included.

Based on the study results and the request by the Government of the Philippines, items to be included within the Increased Food Production Program for 1985 are as follows:

(1) **NFAC**

Fertilizer

Type	Content Rate (N-P-K)%	Amount (t)	Nitrogen Quantity (t)
Urea	45-0-0	7,151	3,218
Compound Fertilizer	14-14-14	7,300	1,022
NP	16-20-0	3,000	480
Ammonium Chloride	25-0-0	6,000	1,500
Total			6,220

Agricultural Chemicals

Type	Amount (kg)
Pesticide	
MIPC	40,040
BPMC	20,000
Diazinon	50,000
MEP	30,000
Fenvalerate	3,000
PAP	50,000
DEP	23,000
Fungicide	
EDDP	4,000
Weedicide	
Benthicarb	59,400
SMCA	30,000
Rodenticide	
Coumatetralyl (10%)	1,000
Coumatetralyl (0.75%)	10,000

(2) **NIA and NFA Machinery**

NIA	No. of Units
Wheel loader with back hoe	32
Bulldozer (medium)	6
Motor grader (small)	10
NFA	
Portable precleaner	18
Portable dryer	18
Small-scale rice mill (1t/hr): Portable	9
- do - : Stational	9
Portable Warehouse (250 ton capacity)	18
Testing husker	38
Testing mill	38
Double beam balance	45
Test thickness grader	38
Infrared moisture meter	3

Cost required for provision of the above items is estimated at ¥2.5 billion (fertilizer: ¥1.2 billion, agricultural chemicals: ¥0.5 billion, NIA construction equipment: ¥0.4 billion, NFA farm machinery: ¥0.4 billion).

(2) Evaluation of Past Contributions Under the Program

Since the Increased Food Production Program was first begun in 1977, the Philippines has been a recipient of the same, receiving a total of ¥16 billion in farm related inputs. Of this, 57% was in fertilizers, 14% in agricultural chemicals and 29% in agricultural machinery. NFAC has received the majority of Program items at 74%, with NFA and NIA receiving 17% and 9%, respectively. Although the selling price of fertilizers provided by Japan is over 20% higher than that provided by other countries such as Indonesia, it is highly evaluated in terms of quality and effectiveness by dealers and farmers alike and is a popular sales item.

Agricultural chemicals provided under the Program since 1979 have been sold to domestic agrochemical firms by NFAC. These firms process and manufacture the chemicals and sell them to the farmers through small retailers and middlemen. Prices are determined in consideration of competitive price.

Agricultural machinery, with the exception of some NFAC mini-tractors and knapsack type sprayers, are being used by government agencies (mainly NFA and NIA) and are generally very well-maintained and operated.

As evidenced by the above discussion, the Program has had a positive and effective impact on increasing food production in the Philippines.

Deposit of counterpart funds varies depending on the recipient agency of the Program. NFAC has been depositing proceeds from sale of inputs to the private sector since the Program commenced in 1977 and has used these funds for agriculture related projects in discussion with the Government of Japan. NIA and NFA, on the other hand, include the equivalent FOB price for the counterpart fund in the general budget; however, the procedure for entering accounts and recording expenditures of the counterpart fund is unclear. The NFA plans to stop entering the equivalent price in the general budget as of 1985 and instead to set up a seperate account for counterpart funds in local currency. NIA has no plan to set up a counterpart fund; however, it is preferable that they establish a separate account for savings derived from items provided under the Program in order to clear the amount and use.

(3) Proposed Improvements in the Program

1) Submission of the request to the Government of Japan is frequently delayed. As this prevents adequate study of the request items, it is recommended that the request be submitted before the year in which assistance is desired.

2) At present it is difficult to assess the impact of the Program as the items are distributed on a nationwide scale. The distribution system should therefore be revised to correspond with the original Program objective of assistance to specific development projects within a clearly defined area.

3) As direct sale of farm machinery to farmers is difficult, it is recommended that a machinery hire service be undertaken by well-managed farmers' cooperatives and that rental fees be used for counterpart funds.

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ABBREVIATIONS AND GLOSSARY

(1) Agencies

ADB	Asian Development Bank
APIP	Agricultural Pesticide Institute of the Philippines
AMC	Area Marketing Cooperatives
AMMDA	Agricultural Machinery Manufacturers and Distributors Association, Inc.
BAEcon	Bureau of Agricultural Economics
BPI	Bureau of Plant Industry
BS	Bureau of Soils
FaCoMa	Farmers Cooperatives Marketing Association
FERMAP	Fertilizer Marketing of the Philippines
FPA	Fertilizer and Pesticide Authority
FSDC	Farm System Development Corporation
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IMF	International Monetary Fund
IRPP	Intensified Rice Production Program
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
MAF	Ministry of Agriculture and Food
MCFC	Maria Cristina Fertilizer Company
NFA	National Food Authority
NFAC	National Food and Agricultural Council
NEDA	National Economic and Development Authority
NIA	National Irrigation Administration
PPI	Planters Products Inc.
PNB	Philippine National Bank
RIS	River Irrigation System
RP	Republic of the Philippines
SEWS	Surveillance and Early Warning Systems

(2) Volume

cm^3	cubic centimeter
ℓ	liter
m^3	cubic meter
MCM	million cubic meter

(3) Weight

g	gram
kg	kilogram
t/ton	metric ton

(4) Time

sec	second
min	minute
h	hour
d	day
ca	cavan (50kg)

(5) Currency

US$	US dollar
¥	Japanese yen
₱	Philippine peso

FERTILIZER ABBREVIATIONS AND OTHER

N	-	Nitrogen nutrient (N)
P	-	Phosphate nutrient (P_2O_5)
K	-	Potash nutrient (K_2O)
AS	-	Ammonium Sulphate containing 21% N
ACI	-	Ammonium Chloride containing 25% N
KCI	-	Potassium Chloride containing 60% K_2O (also known as Muriate of Potash)
NPK	-	Compound/mixed fertilizers containing N, P, K in varying ratios generally 14-14-14 and 12-12-12
NP	-	Compound fertilizer containing 16% N plus 20% P_2O_5)
Palay	-	Unhusked rice
Urea	-	Nitrogenous fertilizer containing 45% N

CHAPTER I

INTRODUCTION

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INTRODUCTION

The Government of the Philippines in implementing the revised Five-year Development Plan (1984-87) aimed at increasing national economic growth and improving the standard of living. National economic forecasts in the present Five Year Plan are based on agriculture as the key to future economic growth in the Philippines. Moreover, as agriculture is regarded as the production base of the national economy, policies concerning farmers and agriculture are given top priority in planning.

The Increased Food Production Program financed by the Government of Japan is included within the above Plan. The ninth commodity request for this program is presently being processed. Requested items contribute both directly and indirectly to food production increases and include fertilizers, agricultural chemicals and farm machinery which are difficult to import due to lack of foreign currency. Total assistance provided by Japan under the Increased Food Production Program from 1977 to 1984 was ¥16 billion; this assistance was given only on the basis of requests from the Philippine side without implementation of a preliminary survey or basic design study.

The Philippine economy has suffered from adverse international economic conditions resulting from two successive oil shocks and improvement has been slower than originally anticipated by the Philippine Government. Foreign currency conditions in particular have worsened prompting devaluation of the peso. Consequently, the price of fertilizers and agricultural chemicals, supply of which is dependent on imports, have more than doubled so that farmers are unable to purchase the amount required.

The Japanese Government intends to contribute another ¥2.5 billion for 1985. Accordingly, it was decided to dispatch a Basic Design Study Mission to study the contents and background of the Program including previous supply of inputs, machinery and funds, draw up a basic design for future provision of fertilizer, agricultural chemicals and farm machinery, estimate cost and study the Program's appropriateness.

The Basic Design Study Mission headed by Mr. Yamazaki, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs was undertaken from 22 October to 8 November 1985. Discussions and hearings were held with people concerned in the Philippines (ANNEX A-2) and the results of survey of previous assistance in Iloilo, Isabela, Nueva Ecija and Bulacan area, were discussed by concerned officials of the Philippine Government and the members of the Mission and compiled as the Minutes of the Meeting (ANNEX A-4). This report presents the analysis of the conditions surrounding the past Increased Food Production Program such as economic and food production conditions, study of and basic design for the contents of the request for 1985, as well as recommendations for future Increased Food Production Program assistance, including that for 1985.

CHAPTER II

PROJECT BACKGROUND

CHAPTER II

BACKGROUND

2.1 Socioeconomy

The Philippines comprises a great diversity of cultures and languages in an archipelago consisting of about 7,000 islands stretching over a distance of 2,000km. The four most populous islands -- Luzon, Mindanao, Negros and Cebu -- account for 80% of the total population with Luzon alone accounting for 50%. In recent years, the capital city of Manila has grown disproportionately compared with other parts of the country; between 1970 and 1983 its population increased by 60% to an estimated 6.5 million people. The national population of 52 million is growing at an annual rate of 2.5%, which is lower than the 3.1% growth of the early 1970s, though economic growth throughout the 1970s was creditable with an average annual real growth in GNP of 6.3% between 1972 and 1978. The annual income per capita of the Philippines in 1982 was US$820.

The serious economic situation currently facing the Philippines has its less immediate beginning with the second oil shock in 1979. The world recession that followed the oil price rise further affected the economy through falling prices of Philippine export products and softening demand for major Philippine commodity exports. At the same time the Government, in the expectation that the recession would be short-lived, adopted a counter-recessionary expenditure policy to ensure that short-term factors did not unduly dampen the growth of the economy. These developments led to a steadily tightening foreign exchange position during 1980-1984, unrelieved by a world recovery and a pick up in Philippine export earnings.

In late 1982 it became apparent that such borrowing and expansionary expenditure policies could not be sustained without a vigorous global recovery. Thus, the Government acted to reduce the burgeoning budget deficit and rein in foreign borrowing levels. In early 1983 the International Monetary Fund (IMF) provided assistance to the Philippines under a stand-by agreement and the Compensatory Financing

Facility. The constrained economic situation was severely exacerbated by the events of the third quarter of 1983, when a sudden and large outflow of foreign exchange and a contraction of foreign trade financing facilities led the Government to announce a 90-day moratorium on principal repayments of private commercial foreign loans. The moratorium was renewed in January and September 1984, and the Government is holding discussions with the IMF for another stand-by agreement and with a consortium of major foreign private creditors in an effort to restore external capital flow to the Philippines. An external debt rescheduling program has been prepared in consultation with foreign commercial banks and a meeting of the Paris Club is intended to determine the rescheduling of official bilateral assistance.

The deteriorating economic situation has occurred at a time when the country would normally have benefitted from the results of three major structural adjustment programs in place since the beginning of this decade covering the financial, industrial and energy sectors. These programs were designed to correct fundamental and long-standing sectoral structural problems. The effects of the disruption of the three programs remain to be fully assessed but progress has been slowed considerably.

Comparatively slow economic growth in recent years reflects the country's position in the world economy as a middle income developing country both oil-import dependent and largely primary product export-oriented. As such, under the impact of rising oil prices and faltering commodity export prices, the balance of payments performance for 1980-1984 contributed to a dampening effect on economic growth. The 6.3% annual average growth rate in GNP for 1970-1979, fell to an average of only 3.6% in the recessionary period from 1980-1982.

Economic growth in 1983, under impact of third quarter events, is estimated to have fallen markedly to about a 1.0% increase in real GNP. Growth in the second half of the year was most likely negative, following modest real growth in the first half of the year. Manufacturing was most immediately affected by a slowdown in the third quarter; stocks of imported inputs were steadily run down leading to some product shortages towards the end of the year and in 1984. Unemployment and underemployment rates accelerated sharply in major urban areas (figures are yet to be finalized). Agricultural sector growth suffered from a drought in the

southern regions from mid-1983 to early 1984, which led to a decline in production of coconuts and sugar, contributed to the stagnation in rice production and the downward revision in the corn production target. Overall sector growth in 1983 and 1984 has declined to a negative 2.0 and 4.6%. The pronounced deceleration in the growth rate of the economy through 1983 and 1984 further constrained incomes and employment, particularly for the large proportion of the population categorized as living below the poverty line.

The export earnings during the first seven months of 1985 have dropped by 30% compared to the comparative period of 1984 because of the decline in prices of a number of the Philippines major traditional export products. The balance of payments performance in 1984 has recovered to a US$258 million surplus compared to the US$2.59 billion deficit in 1983. The balance of trade has significantly decreased from a US$2.5 billion deficit in 1983 to a US$680 million deficit in 1984. The peso steadily depreciated from ₱14.0: US$1 in March 1984 to ₱16.7 in October 1984; therefore the peso rate was floated. In November 1985, the peso stabilized at ₱18.7: US$1.

Total outstanding external debt at the end of 1984 was estimated at US$24.6 billion consisting of US$9.9 billion in short-term debts and US$14.99 billion is owned by the public sector. Although debt rescheduling programs covering private bank creditors and official bilateral sources are yet to be agreed upon, the Government has announced it is principally seeking to convert short-term debt into medium- and long-term maturities and ease other repayment obligations over the next few years.

The gross internal reserves as of October 4, 1985 are estimated at US$1,513 million or the equivalent of two and a half months of merchandise imports, which has much improved from the level of US$866 million at the end of 1984.

2.2 Agricultural Sector and Agricultural Policy

2.2.1 Natural Conditions

(1) Climatic Conditions

The country belongs to the monsoon zone, and has an oceanic tropical climate basically composed of two seasons: the wet season and the dry season. The climate is classified into the following agroclimatic zones (FIG. 2-1):

Type I: Two pronounced seasons: dry, from December to May; and wet, from June to November

Type II: No dry season with a very pronounced maximum rainy period in December and January

Type III: Intermediate type with no pronounced maximum rainy period and a short dry season lasting only two or three months

Type IV: Uniformly distributed rainfall throughout the year

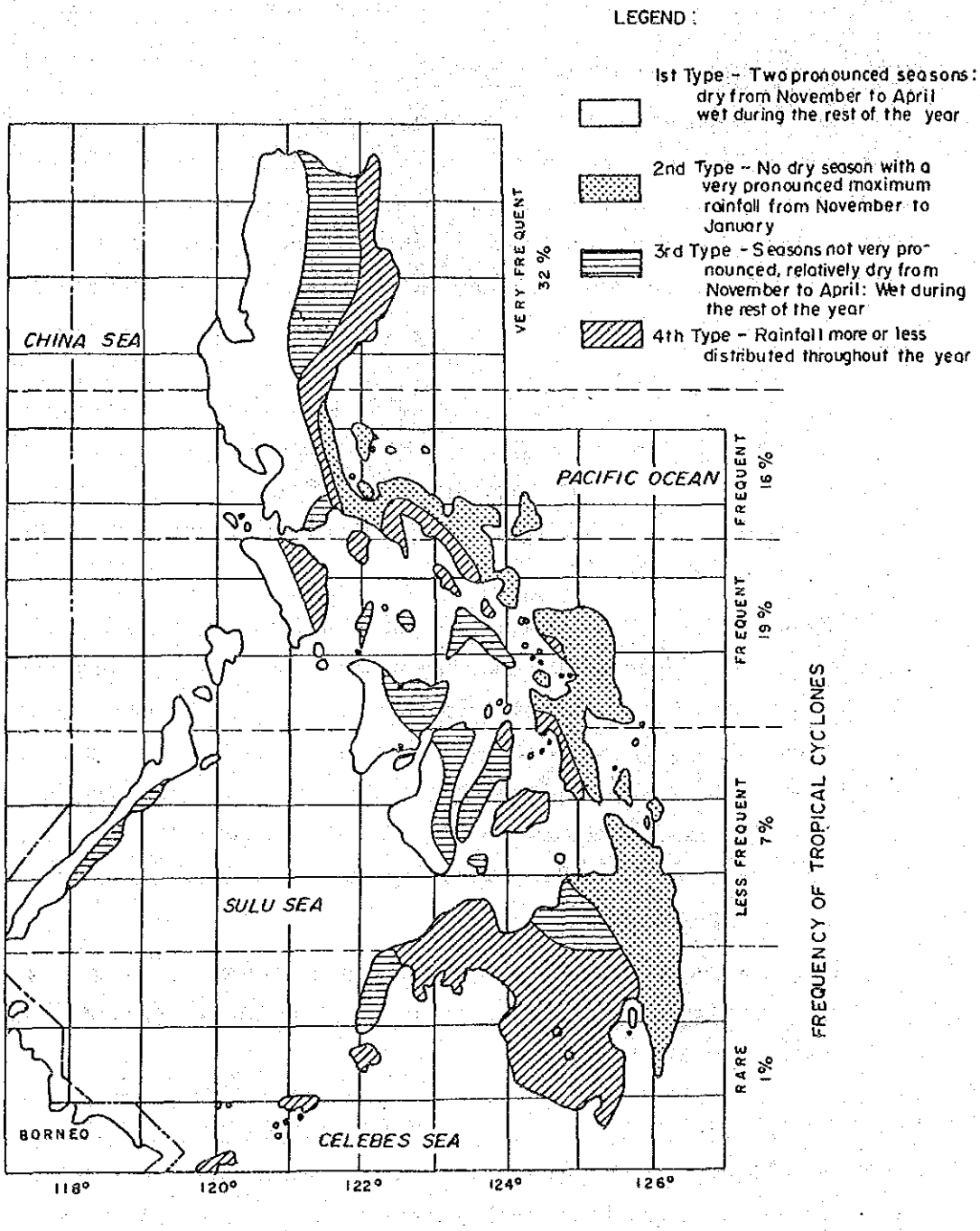
Monthly rainfall fluctuates unpredictably each year. These yearly variations hinder stable production of agricultural produce in the country and result in annual discrepancies in the effect of fertilizer application, particularly for rainfed paddy and upland crops.

Heavy rainfall also causes serious soil erosion particularly in Type-I and Type-III zones, although the severity depends on topography. Cropping patterns differ with each region and are adapted to seasonal patterns of rainfall. In Type-I and Type III zones, the majority of planting is concentrated in May and June at the beginning of the wet season, while second-croppings in the dry season are undertaken anytime from October to January. In the Type-II zone, crops are planted year-round while the cropping pattern in the Type-IV zone is intermediate between the patterns of Type-I and Type-III zones and that of Type-II zone.

Although the archipelago is scattered over 1,850km from south to north, there is little variation in temperature between each

FIG. 2-1

PHILIPPINES CLIMATE CLASSIFICATION BY CORONAS



region with an annual mean temperature of 26 to 27°C, a maximum of 34° to 35°C and a minimum of 20° to 24°C. The Philippines is located in the typhoon belt and according to the records of the past 18 years, about 20 typhoons pass the country every year, most frequently occurring in the four months from July to October. The damage caused by these typhoons in considerable.

(2) Available Land for Agriculture

Different estimates have been made on available land for agriculture. According to the estimate of NEDA however, potential lands for agricultural expansion exist in Regions I to IV, Region VIII and Region X. Luzon has the largest potential land area whereas in Mindanao harvested area already exceeds the potential.

(3) Water Supply

There are 421 rivers, including the Mindanao and Cagayan rivers, and the country's ground water reserves are estimated at 250,000 million m^3. The majority of surface water is located in Regions II, VII and VIII, while the majority of ground water occurs in Regions III and IV (FIG. 2-2).

Development of irrigation has been undertaken mainly in Type-I zone for the purpose of securing water supply in the dry season and thereby extending second croppings of palay. Several national irrigation projects are being implemented under the six year irrigation development plan (1981-1986). The plan calls for completion of about one half of the ulimate target, 1,256,000ha, of new irrigated area while improving approximately 320,000ha of presently irrigated area.

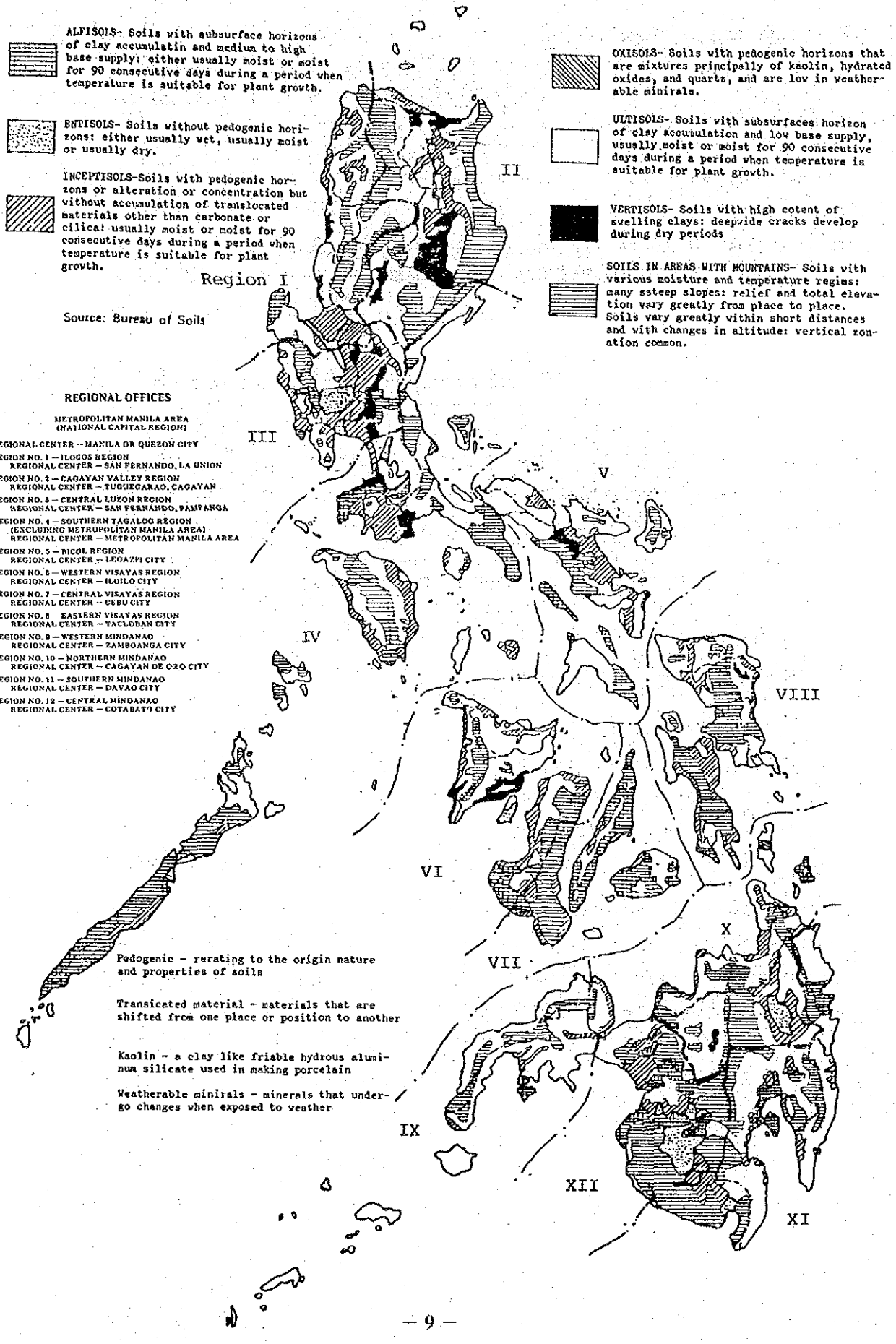
The quality of river water is characterized by a modest pH level and a high SO_4 content, as well as a low K content, while ground water is characterized by low pH.

(4) Soil Conditions

A soil map is presented in FIG. 2-2 while TABLE 2-1 shows the aerial extent of various soil orders. Soil orders derived from parent materials are complexly distributed throughout the country.

FIG. 2-2

REGIONAL AND SOIL MAP OF THE PHILIPPINES



PLANIMETRIC ESTIMATE OF AERIAL EXTENT OF VARIOUS SOIL ORDERS OF THE PHILIPPINES

Orders	Area (hectares)
Ultisols	11,311,230
Inceptisols	3,945,580
Alfisols	2,765,487
Vertisols	1,015,274
Entisols	658,536
Mountainous areas	8,289,008

Source: A.A. BRIONES, The Nature Distribution and management of some problem soils in the Philippines. (UPLB)

The majority of soil orders contain Ultisols, followed by Inceptisols, Alfisols, Vertisols, and Entisols, whereas the distribution of Oxisols is very limited.

TABLE 2-2 shows the distribution of land areas by land capability and by region. Class A, defined as very good land, accounts for 19%, while Class B, defined as good land, accounts for 34% including 19% for water stress areas. Class C, defined as limited land for cultivation, accounts for 19%. Soil erosion is the main problem which occurs in Classes C and D.

2.2.2 Agricultural Sector in the National Economy

(1) General

The agricultural sector employs more than 85% of the employed rural population which is equivalent to 52% of total employment in the country in 1983. The agricultural sector's contribution to GDP was around 25% in 1983 with export of agricultural products accounting for 25%.

In the Philippines, rice, corn and coconuts are the dominant crops, accounting for more than 80% of all farms, and approximately 75% of all farm area.

(2) Rice

Small farmers are predominant in rice cultivation. In the 1970s, new technology to improve productivity was intensively introduced, mainly in irrigated areas.

The Masagana 99 program was also implemented to promote rice production and has played a very important role in production improvements. As a result, supply exceeded domestic consumption in 1976. However, due to natural disasters such as typhoon and drought, as well as worsening economic conditions beginning in 1980, rice was again imported from 1984. The balance between supply and demand is shown in TABLE 2-3.

AREA OF LAND CAPABILITY AND SUB-CLASSES BY REGION

(Unit: ha)

Reg.		Suitable classes for cultivation									Other class	Total
		A	Be	Bw	Bs	Cs	Cw	Ds	Dw	Sub-total	Sub-total	
R1	Ha	235,209	-	58,371	51,743	10,706	-	20,883	21,442	398,354	1,761,320	2,159,674
	%	59.0	-	14.7	13.0	2.7	-	5.2	5.4	100.0		
R2	Ha	216,737	4,709	242,069	7,368	5,565	-	424,049	15,720	916,217	2,724,083	3,640,300
	%	23.7	0.5	26.4	0.8	0.6	-	46.3	1.7	100.0		
R3	Ha	186,552	17,029	139,785	291,650	59,943	-	37,431	2,106	734,496	1,093,289	1,827,785
	%	25.4	2.3	19.0	39.7	8.2	-	5.1	0.3	100.0		
R4	Ha	282,999	276,850	128,677	55,022	418,331	-	343,682	41,363	1,546,924	3,200,662	4,747,586
	%	18.3	17.9	8.3	3.6	27.0	-	22.2	2.7	100.0		
R5	Ha	48,405	-	147,437	8,012	14,661	-	164,098	10,036	392,649	1,370,580	1,763,229
	%	12.3	-	37.6	2.0	3.7	-	41.8	2.6	100.0		
R6	Ha	38,920	32,522	252,743	49,955	6,589	-	58,316	15,955	455,000	1,567,311	2,022,311
	%	8.5	7.1	55.5	11.0	1.5	-	12.8	3.6	100.0		
R7	Ha	24,448	93,470	96,601	-	24,500	-	-	6,057	245,076	1,250,066	1,495,142
	%	10.0	38.1	39.4	-	10.0	-	-	2.5	100.0		
R8	Ha	97,364	68,632	149,477	30,272	534,344	-	173,907	11,603	1,065,599	1,077,570	2,143,169
	%	9.1	6.4	14.1	2.8	50.0	-	16.5	1.1	100.0		
R9	Ha	92,064	12,125	13,001	17,501	243,501	938	281,601	-	660,731	1,207,783	1,868,514
	%	13.9	1.8	1.9	2.6	36.9	0.1	42.8	-	100.0		
R10	Ha	101,349	12,188	107,493	9,874	93,578	-	389,699	5,213	719,394	2,113,380	2,832,774
	%	14.1	1.8	14.9	1.4	13.0	-	54.1	0.7	100.0		
R11	Ha	186,082	39,751	111,831	43,438	80,313	2,000	63,313	37,706	564,434	2,077,086	2,641,520
	%	33.0	7.0	19.8	7.7	14.2	0.4	11.2	6.7	100.0		
R12	Ha	94,187	61,468	181,392	103,938	52,210	-	332,535	-	825,730	1,515,001	2,340,731
	%	11.4	7.4	22.0	12.6	6.3	-	40.3	-	100.0		
Total	Ha	1,604,316	618,744	1,628,877	668,773	1,544,241	2,938	2,289,514	187,201	8,524,604	20,958,131	29,482,735
	%	18.8	7.3	19.1	7.8	18.1	0.1	26.8	2.0	100.0		

Note: Class: A .. very good land for cropland B .. good land C .. Moderately good land D .. fairly good land
Other class: L,M .. Pasture land N .. forest land X,Y .. Wildlife
Sub-class: e .. to mean erosion as the main problem of the soil; w .. to mean water as the main problem;
s .. to mean soil condition such as too sandy, or poor physicl and chemical characteristics of the soils as the principal problem.

Source: Bureau of Soils (1977).

ACTUAL AND PROJECTED CAPACITY/DEMAND, RICE

(Unit: '000 ton)

Crop Year (July-June)	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Use				Ending Stocks	Milling Recovery
						Seed	Feed & Waste	Food Use			
								Total	Per Capita (kg)		
Actual											
1971/72	632	3,111	633	4,376		115	215	3,348	87.1	698	0.610
1972/73	698	2,715	238	3,651		176	185	2,845	72.0	445	0.615
1973/74	445	3,468	311	4,224		239	236	2,912	71.7	837	0.620
1974/75	837	3,538	238	4,613		142	248	3,294	79.0	929	0.625
1975/76	929	3,880	71	4,880		151	280	3,672	85.7	777	0.630
1976/77	777	4,100	24	4,901		160	283	3,617	82.3	841	0.635
1977/78	841	4,607	7	5,455	46	189	304	3,704	82.1	1,212	0.640
1978/79	1,212	4,850	0	6,062	38	194	330	3,960	85.5	1,540	0.645
1979/80	1,540	5,093	0	6,633	236	204	346	4,272	89.9	1,575	0.650
1980/81	1,575	5,020	0	6,595	175	200	326	4,502	93.6	1,331	0.650
1981/82	1,331	5,279	0	6,610	10	211	343	4,526	90.5	1,520	0.650
1982/83	1,520	5,040	0	6,560	11	202	328	4,550	88.8	1,469	0.652
Projected	(Assuming self-sufficiency)										
							*2				
1984/85	1,490	5,460	0	6,950	0		570*3	4,890	90.2*2	1,490*1	0.655*2
1989/90	1,490	6,538	0	8,028	0		682	5,856	94.1	1,490	0.660
1994/95	1,490	7,336	0	8,826	0		763	6,573	95.4	1,490	0.665
1999/2000	1,490	8,232	0	9,722	0		854	7,378	96.8	1,490	0.670

Note: *1 Average of last 5 years.
*2 Interpolation for the projection by IFRRI study.
*3 Including seed.

Source: Statistics Division, BAEcon; Policy Analysis Staff, BAEcon.
(Reproduced from: IFRRI, "Assessment of Food/Demand ...")

(3) Corn

Corn yields in the Philippines are very low owing to such factors as the unavailability of disease-resistant HYVs, lack of drying facilities, inadequate seed control, low level of fertilizer and pesticide use, and the resulting heavy losses from pests and diseases. Further, access to corn farms is often poor and they are geographically scattered, which makes extension work difficult. TABLE 2-4 shows the balance between supply and demand.

(4) Sugar Cane

The sugar industry has played an important role in earning foreign exchange. Unlike the rice, corn, and coconut sectors, the sugar industry is dominated by large estates. Sugar prices are extremely unstable compared with those of other primary commodities in international trade and the international price of sugar is not expected to increase as the majority of sugar producing countries intend to continue production.

(5) Coconut

Coconut growing is one of the country's most important economic activities, yet it has been the most neglected in many respects. Traditionally, coconuts were grown by small holders.

Approximately 90% of the coconuts produced in the Philippines are processed into copra. However, the traditional markets for coconut oil are being threatened by cheaper oils, such as palm and soybean, and synthetic detergents and laundry soaps.

2.2.3 Agricultural Development Strategies and Policies of the Government

(1) Emphasis on Agricultural Development

The serious food shortage which resulted in imports in the early 1970s coupled with prospects for development in rice productivity through new rice technology, led to an emphasis on agricultural development. The main emphasis was on improved rice productivity and development policies were quite successful resulting in self-sufficiency in rice in the late 1970s.

ACTUAL AND PROJECTED CAPACITY/DEMAND, CORN

(Unit: '0000 ton)

Crop Year (July-June)	Beginning Stocks	Production	Imports	Total Supply	Exports	Domestic Use					Ending Stocks
						Seed	Feed & Waste	Other Non-Food	Food Use Total	Food Use Per Capita (kg)	
Actual											
1969/70	46	2,013	9	2,068	0	39	651	53	1,205	33.2	120
1970/71	120	2,012	31	2,163	0	39	671	52	1,253	33.5	148
1971/72	148	2,024	193	2,365	0	40	754	73	1,257	32.7	241
1972/73	241	1,843	90	2,174	0	38	684	89	1,267	32.1	96
1973/74	96	2,258	91	2,445	0	43	738	90	1,317	32.4	257
1974/75	257	2,514	159	2,930	0	49	832	97	1,709	41.0	243
1975/76	243	2,717	54	3,014	0	52	884	103	1,822	42.5	153
1976/77	153	2,775	160	3,088	0	53	1,123	112	1,646	37.4	154
1977/78	154	2,796	134	3,084	0	51	1,205	119	1,556	34.5	153
1978/79	153	3,090	56	3,299	0	83	1,274	122	1,556	33.6	264
1979/80	264	3,123	93	3,480	0	84	1,559	136	1,553	32.7	148
1980/81	148	3,110	351	3,609	0	81	1,674	146	1,533	31.4	175
1981/82	175	3,290	275	3,740	0	88	1,786	155	1,539	30.8	172
1982/83	172	3,126	406	3,704	0	89	1,875	165	1,582	30.9	170
Projected	(Assuming self-sufficiency)						*2	*2			
1984/85	185	3,998		4,183	0		2,025*4	290*3	1,683*2	31.1*2	185*1
1989/90	185	4,824		5,009	0		2,453	405	1,966	31.6	185
1994/95	185	5,859		6,044	0		3,215	465	2,179	31.6	185
1999/2000	185	7,163		7,348	0		4,213	534	2,416	31.7	185

Note: *1 Average of last 5 years.
*2 Interpolation for the projection by IFPRI study.
*3 Including seed and waste.
*4 Feed only.

Source: Policy Analysis Staff, BAEcon, based on data from BAEcon, SSD, and NFA.

With this improvement in the rice supply situation, development of rainfed agriculture was regarded as a potential source of future agricultural growth as well as a direct means for improvement of income distribution. In this connection, the Government introduced programs which emphasized rainfed areas such as the Maisagana program which concentrated on corn production and several projects under the Kilusang Kabuhayan at Kaunlaran.

However, due to economic conditions in the 1980s and a rice shortage resulting from natural disasters, policy was again focused on increasing rice production together with reduction in food imports especially of corn.

(2) Development Goal and Agricultural Sector

Food security and stability is the most important goal of agricultural development. This target will be realized through increased productivity and expanded use of food crops and will be pursued through the following:

a) Attainment of self-sufficiency in all staples and basic food items such as rice, corn, pork, poultry, beef, fish, vegetables and legumes, including feed ingredients;

b) Expansion of agri-based commodity exports which include;

- Traditional exports -- coconut, sugar, banana, pineapple, tobacco, abaca
- New exports -- yellow corn, fish products, coffee, cacao, mango, papaya

c) Replacement of selected imported food and non-food agricultural commodities which include;

- yellow corn, soybeans, cassava, sweet potato, cotton, and dairy

d) Increased production of other crops and agricultural commodities.

2.3 Main Categories under the Increased Food Production Program

In order to achieve the Study objectives the present status of fertilizer, agrochemical and farm machinery supply and consumption was first clarified.

2.3.1 Fertilizer Consumption in the Philippines

(1) Total Consumption

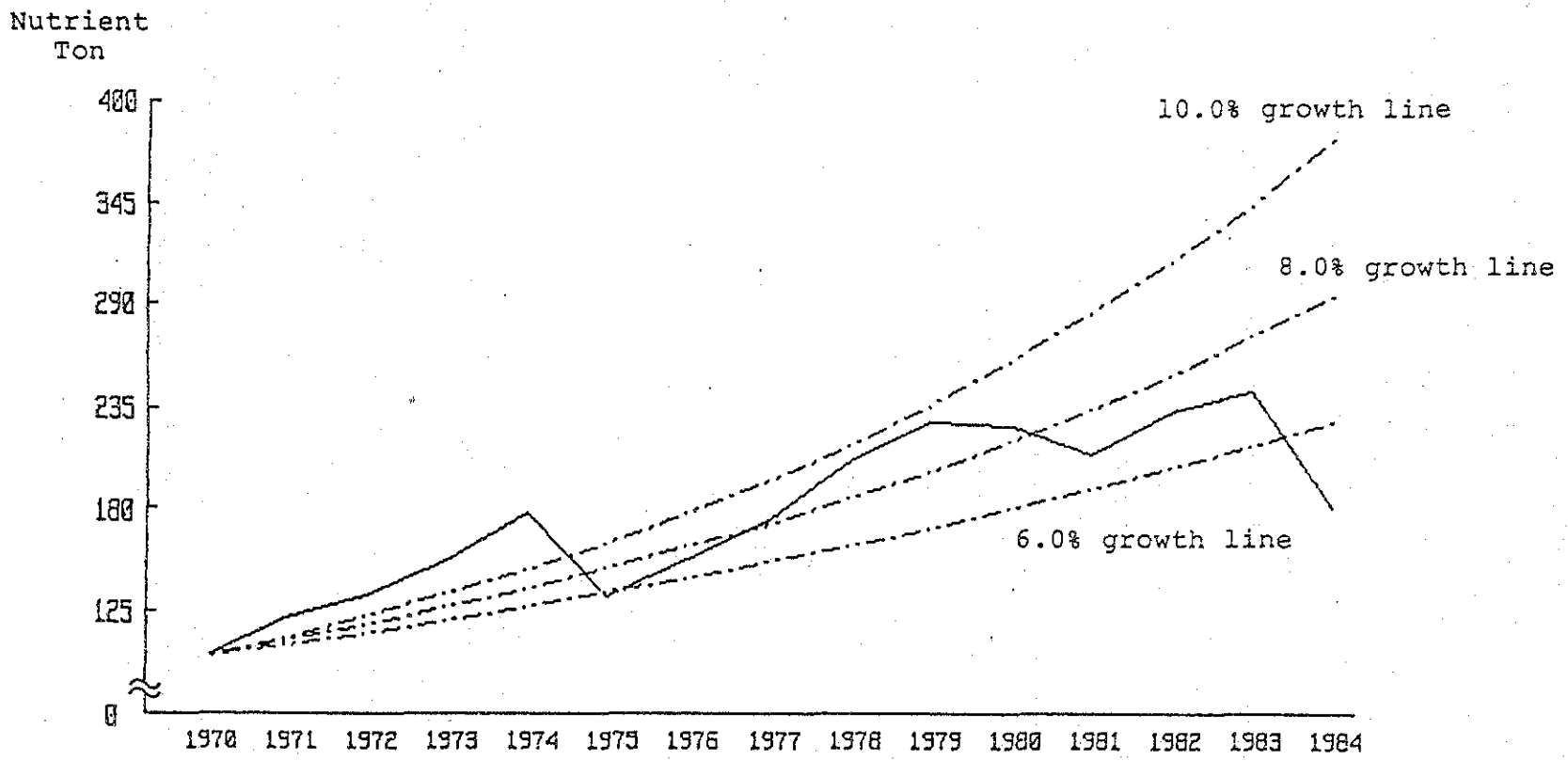
Apparently, fertilizer consumption, especially that of nitrogen fertilizer increased steadily in the early 1970s as shown in FIG. 2-3 to 2-5. Consumption decreased in 1975 due to price hikes as well as excess stock. Subsequently, consumption increased until 1979, when the price of fertilizer rose. If the years 1970-72, 1977-78, and 1982-83 are regarded as normal years in terms of inventory level and therefore, withdrawals from warehouse stock in these years represent actual consumption, the annual growth rate of nitrogen fertilizer consumption during the 5 years between 1972 and 1977 was 5.6% whereas that between 1977 and 1982 was 5.9%. Therefore, the long-term consumption trend of nitrogen fertilizer showed a steady increase up to 1983.

The annual growth rate of the 5 years between 1972 and 1977 was 2.9% for phosphate and -1.0% for potassium fertilizer. The rate for the 5 years between 1977 and 1982 was 6.7 and 4.5% respectively, but the actual increased volume was only 15,500 P205 tons and 11,300 K20 tons, respectively. In 1984, consumption decreased by 26% for nitrogen, and 17% and 40% for phosphate and potassium, respectively. With such differences in the consumption growth rate observed among different fertilizer nutrients, the $N:P_2O5:K_2O$ ratio changed from 1:0.31:0.42 in 1970 to 1:0.22:0.26 in 1983.

(2) Consumption by Kind of Fertilizer

TABLE 2-5 shows the trend of consumption by kind of fertilizer. In the early 1970s urea accounted for 45-55% of total nitrogen ammonium sulphate accounted for 20-30% and NP and NPK 12-15% and 10-12%, respectively. However, the share of urea among nitrogen fertilizers has increased conspicuously, with urea around 70% in 1983. Ammonium sulphate was most affected by the increase in the share of urea and its share decreased to 10% whereas that of NP and NPK has remained fairly stable with both shares being 10% respectively.

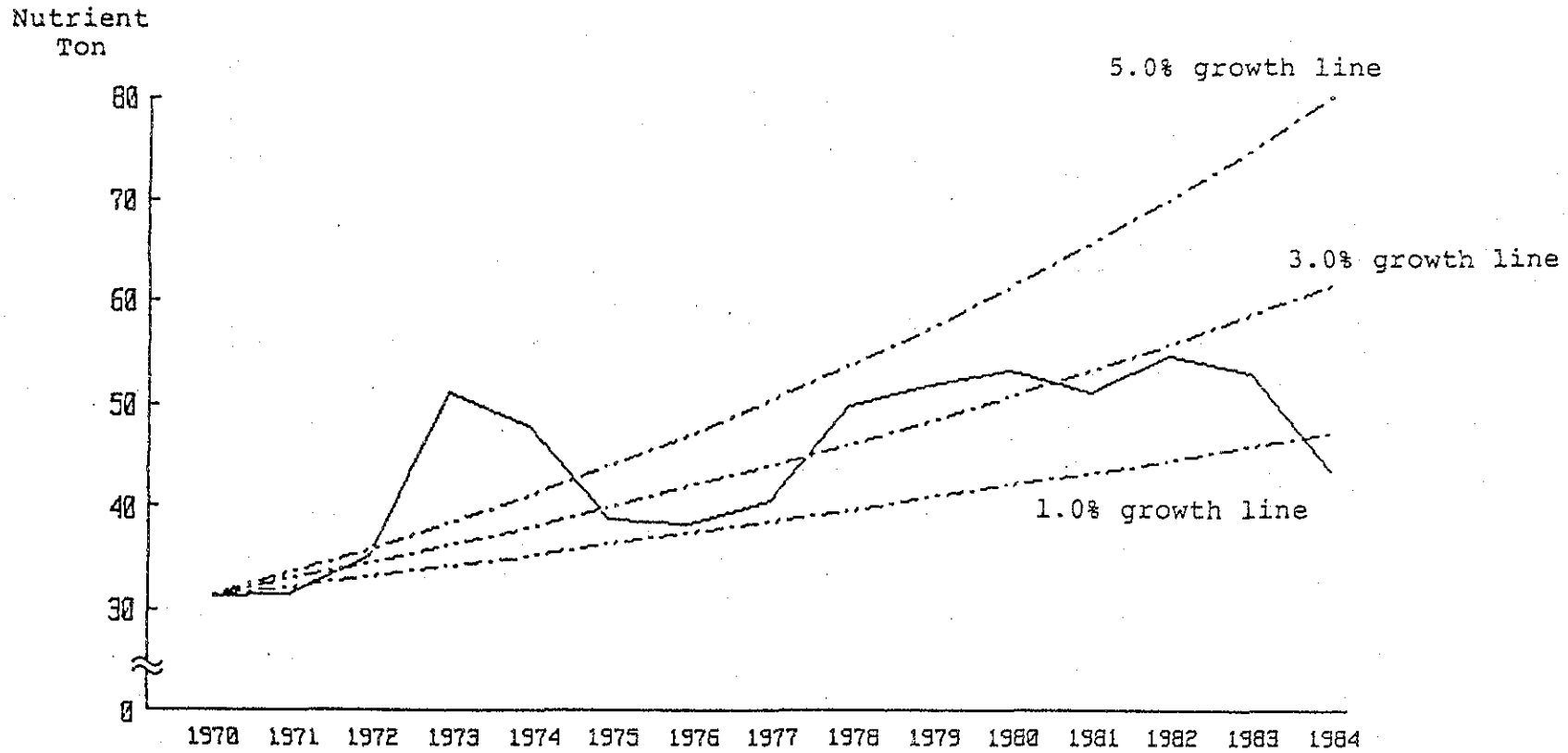
PAST TREND OF NITROGEN FERTILIZER CONSUMPTION IN THE PHILIPPINES



Source: Fertilizer Sector Study. ADB 1985

FIG. 2-3

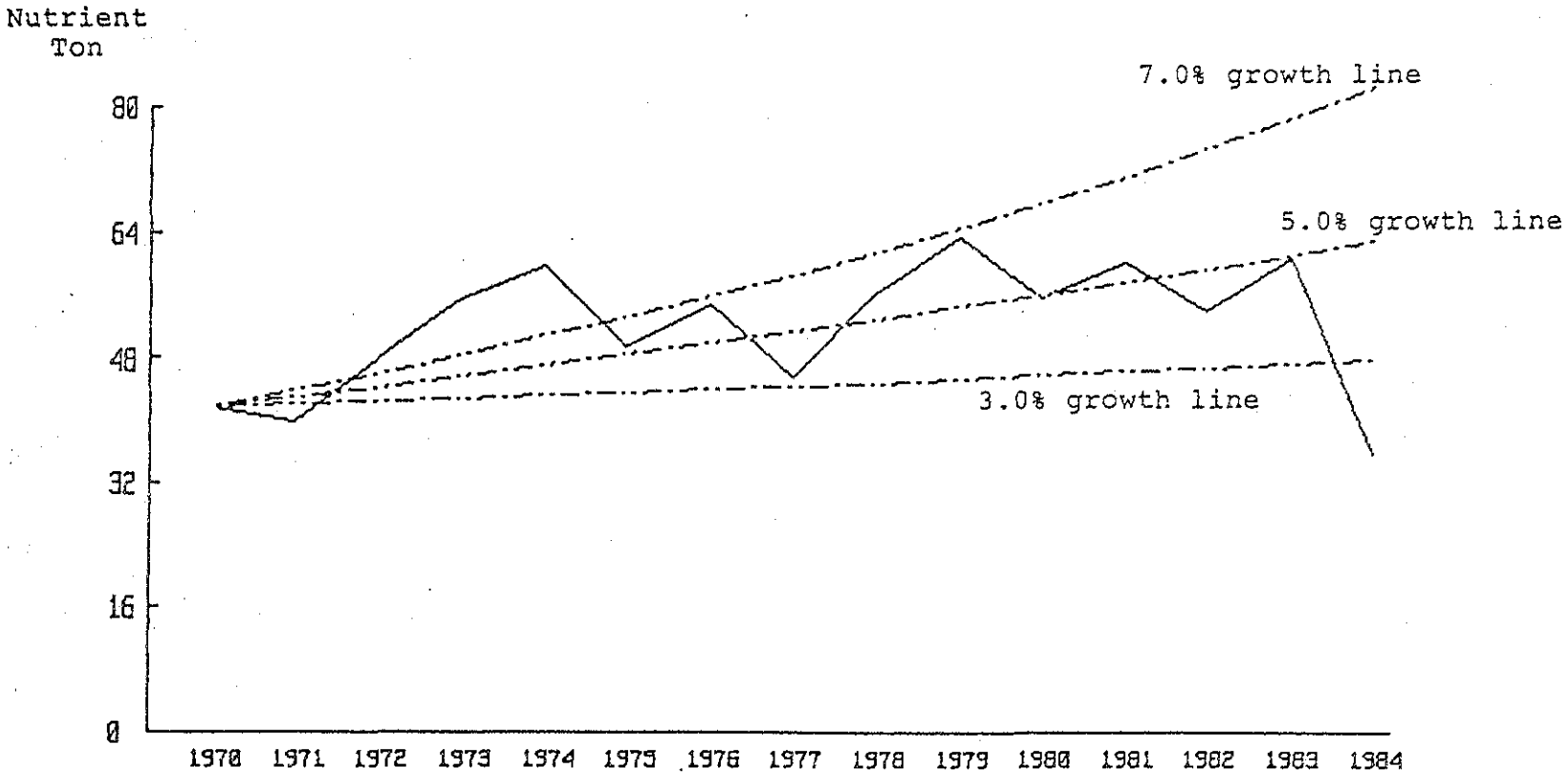
PAST TREND OF PHOSPHATE FERTILIZER CONSUMPTION IN THE PHILIPPINES



Source: Fertilizer Sector Study. ADB 1985

FIG. 2-4

PAST TREND OF POTASSIOUM FERTILIZER CONSUMPTION IN THE PHILIPPINES



Source: Fertilizer Sector Study. ADB 1985

FIG. 2-5

TABLE 2-5

VOLUME OF FERTILIZER CONSUMPTION BY TYPE OF PRODUCT, PHILIPPINE

1971-1984

Year	Urea	Ammosol/can Amchlor	NP&P	NPK	Potash	Total	Total N	Total P	Total K
1970	121.6	116.1	83.1	84.2	49.0	454.0	100.3	31.2	41.9
1971	159.0	130.0	73.9	82.5	46.0	491.4	120.8	31.4	40.2
1972	132.7	134.6	89.2	88.6	47.4	492.5	132.8	35.0	48.2
1973	153.0	210.0	129.4	116.3	68.2	676.9	151.9	51.0	55.6
1974	212.2	200.5	130.7	126.9	68.0	738.3	177.5	47.7	60.0
1975	143.8	167.5	105.5	102.1	58.7	577.8	132.8	38.6	49.7
1976	174.8	185.4	116.0	108.0	59.7	643.9	152.4	38.3	55.1
1977	229.3	177.7	106.1	124.1	48.4	686.6	174.2	40.4	45.9
1978	287.1	171.2	125.3	147.2	60.8	791.6	205.4	49.8	56.6
1979	320.0	175.4	124.2	159.5	69.8	848.7	226.7	51.9	63.7
1980	329.2	143.6	131.8	158.2	56.8	819.6	224.8	53.4	55.8
1981	307.3	126.5	124.2	163.7	63.7	785.4	209.9	51.2	60.6
1982	342.2	140.3	143.1	161.1	58.8	845.9	232.8	56.1	57.4
1983	371.5	137.7	145.2	149.6	73.4	878.3	244.1	54.7	64.5
1984	256.3	118.6	119.2	134.3	34.0	665.2	180.6	45.4	38.6

In the case of phosphate fertilizer, NP and NPK fertilizer accounted for almost all phosphate fertilizer consumption. Muriate of potash accounted for around 60-65% of potassium consumption, while the remainder of potassium comes from NPK fertilizer except for a small amount from sulphate of potash.

(3) Consumption by Region

TABLE 2-6 shows the consumption of fertilizer by region, representing shipment from warehouses in the respective regions. TABLE 2-7 shows consumption by region estimated on the basis of crop-wise consumption. In the case of nitrogen fertilizer, Luzon accounted for 45% of total consumption (in terms of nutrient ton), and Visayas and Mindanao accounted for 35% and 20%, respectively. Among the 12 regions, West Visayas alone accounted for 30% followed by Central Luzon at 14%.

In the case of phosphate fertilizer, 45% was consumed in Visayas, while 38% was consumed in Luzon and the remaining 17% in Mindanao. The consumption of potassium fertilizer was mainly in West Visayas accounting for 40% of total consumption.

(4) Consumption by Crop

Consumption of fertilizer by crop in 1983 is presented in TABLE 2-7. In the case of nitrogen fertilizer, 53% of total consumption was for palay (in terms of nutrient tons), followed by 25% for sugar cane and 8% for corn.

Phosphate fertilizer was used mainly on palay, which accounted for 63% of total consumption, and 22% for sugar cane. Potassium fertilizer is mainly used for palay and sugar cane.

(5) Fertilizer Use for Major Crops

1) Palay

According to various estimates made in the past, fertilizer consumption for palay in the past was:

1973	84,900 N tons
1979	129,300 N tons
1983	128,600 N tons

TABLE 2-6

ESTIMATED CONSUMPTION OF FERTILIZER BY REGION, 1983

(Unit: '000 ton)

Region	UREA	AMM SUL	AMM CHL	14-14 -14	12-12 -12	6-9 -15	6-10 -4	16-20 -0	DAP	TSP	SSP	0-34 -0	MOP	SOP	TOTAL	TOTAL N	TOTAL P	TOTAL K
Ilocos	15.4	6.3	0.0	11.6	0.1	2.0	0.5	5.9	0.0	0.0	0.0	0.0	0.1	0.0	41.9	11.0	3.1	2.0
Cagayan V.	14.6	3.5	0.3	13.7	0.2	0.0	0.1	7.1	0.0	0.0	0.0	0.0	0.1	0.0	39.6	10.5	3.3	2.0
C.Luzon	92.8	17.5	3.5	38.1	0.5	0.6	0.2	27.1	0.3	0.0	0.2	0.0	1.6	0.0	182.4	57.1	11.0	6.5
S.Tagalog	35.9	24.8	0.0	7.7	0.1	0.0	0.1	5.2	0.2	0.0	0.8	0.0	1.4	0.0	76.2	23.6	2.3	1.9
Bicol	8.7	1.0	0.0	5.0	0.1	0.0	0.1	2.8	0.0	0.0	0.0	0.0	0.3	0.0	18.0	5.3	1.3	0.9
W. Visayas	115.2	18.4	7.4	22.5	0.3	0.0	0.0	47.2	13.6	0.0	2.0	0.1	37.4	0.0	264.1	72.0	19.3	25.6
CE.Visayas	16.4	8.9	0.5	21.4	0.3	0.0	0.0	9.9	0.3	0.0	0.2	0.0	3.7	0.0	61.6	14.2	5.1	5.2
WS.Mindanao	52.4	17.8	14.4	13.3	0.2	0.0	0.0	5.9	0.0	1.0	0.1	0.0	18.7	3.3	127.1	34.2	3.6	14.8
N. Mindanao	13.6	7.9	0.3	9.2	0.1	0.0	0.0	9.0	2.5	1.2	0.5	0.0	2.5	2.9	49.7	11.3	5.0	4.3
C. Mindanao	6.5	5.4	0.0	2.5	0.0	0.0	0.0	1.9	0.0	0.0	0.2	0.0	1.5	0.0	18.0	4.8	0.8	1.3
Philippine Total	371.5	111.4	26.3	145.1	1.8	2.7	0.9	122.1	16.9	2.2	4.1	0.1	67.2	6.2	878.5	244.2	54.7	64.4
N ton	170.9	23.4	6.6	20.3	0.2	0.2	0.1	19.5	3.0	0.0	0.0	0.0	0.0	0.0		244.2		
P205 ton	0.0	0.0	0.0	20.3	0.2	0.2	0.1	24.4	7.8	1.0	0.7	0.0	0.0	0.0			54.7	
K20 ton	0.0	0.0	0.0	20.3	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	40.3	3.2				64.4

Note: Estimate based on the shipment from company warehouses in the regions.

ESTIMATED CONSUMPTION OF FERTILIZER BY CROP AND REGION IN 1983

(Unit: Nutrient ton)

		TOTAL	ILOCOS	CAG.V	C.LUZON	S.TAGAL	BICOL	W.VISAY	C.VISAY	E.VISAY	W.MINDN	N.MINDN	S.MINDN	C.MINDN
Palay	N	128,571	19,016	11,094	27,759	15,344	9,548	20,745	1,885	2,114	2,064	4,452	8,750	5,800
	P205	34,294	6,191	3,345	5,023	2,633	1,933	8,298	857	384	364	1,002	2,975	1,289
	K20	22,077	2,346	2,321	2,950	2,233	1,639	1,844	343	192	971	2,115	2,975	2,148
Corn	N	18,548	1,579	236	101	2,878	54	2,278	6,041	482	0	0	0	4,899
	P205	3,482	0	0	0	0	54	456	1,510	10	0	0	0	1,452
	K20	2,815	0	0	0	0	54	152	1,510	10	0	0	0	1,089
Sugarcane	N	60,023	121	682	4,301	7,759	266	42,467	1,667	869	0	1,332	244	315
	P205	12,077	0	0	0	127	61	10,480	159	745	0	266	104	135
	K20	17,918	0	0	0	0	84	17,285	159	124	0	266	0	0
Vegetables	N	6,624	2,759	75	1,419	1,183	58	53	539	11	13	347	156	11
	P205	1,632	720	58	464	23	72	66	23	14	16	90	72	14
	K20	1,275	696	13	415	20	0	0	20	0	0	87	24	0
Others	N	38,262	940	227	53	46	0	6,457	590	2	15,058	2,645	4,143	71
	P205	3,315	257	15	12	12	0	0	1,398	0	1,613	3	0	5
	K20	20,417	487	0	21	23	0	6,319	558	0	8,985	240	1,500	0
Consumption Total														
	N	244,028	24,415	12,314	33,633	27,210	9,926	72,000	10,722	3,478	17,135	8,776	13,293	11,096
	P205	54,800	7,168	3,418	5,499	2,795	2,120	19,300	3,947	1,153	1,993	1,361	3,151	2,895
	K20	64,502	3,529	2,334	3,386	2,276	1,777	25,600	2,590	326	9,956	2,708	4,499	3,237
Withdrawal from Warehouse *1									*2		*3			
	N	244.2	11.0	10.5	57.1	23.6	5.3	72.0	14.2		34.2	11.3		4.8
	P205	54.7	3.1	3.3	11.0	2.3	1.3	19.3	5.1		3.6	5.0		0.8
	K20	64.4	2.0	2.0	6.5	1.9	0.9	25.6	5.2		14.8	4.3		1.3

Notes: *1 Unit: '000 Nutrient ton
*2 Total of Central and Eastern Visayas
*3 Total of Western and Southern Mindanao

(No estimate was available for phosphate and potassium fertilizer.)

It is estimated that the output/input ratio at which farmers applied fertilizer in favorable palay cultivation areas like Ilocos and Central Luzon were around less than 2.0 for irrigated palay, but in most areas the ratio was 2 to 6, and in extreme cases like Central Mindanao it was more than 7. In the case of rainfed areas, the ratio was usually from 4 to more than 6.

Generally, in Southeast Asian countries it is understood that farmers apply fertilizer at a ratio of around 2 or higher. In this connection, the ratio in the Philippines seems to be high, representing the fact that farmers in the Philippines still view palay cultivation as unstable.

2) Corn

Consumption of nitrogen fertilizer for corn is estimated as follows on the basis of various estimates made in the past:

1973	9,300 N tons
1979	29,400 N tons
1983	26,200 N tons

According to BAEcon's survey, only 31% of total corn farmers used fertilizer. The percentage was 46-50% for improved varieties, whereas it was only 18% for traditional varieties.

Despite the fact that a very limited number of farmers used fertilizer and that their application level was lower than recommended dosages, the output/input ratio was very low indicating that application of fertilizer is risky. In the case of traditional varieties, fertilizer application appears unprofitable.

Further increase in fertilizer consumption for corn may be expected only for cultivation of improved varieties under well organized and directed programs.

3) Sugar Cane

The consumption of nitrogen fertilizer was estimated as follows:

1973	69,000 N tons
1979	68,300 N tons
1983	60,000 N tons

Fertilizer application for sugar cane is almost at the economically optimum level, and therefore, an increase in consumption of fertilizer for sugar cane, if any, can be expected only through expansion of cropping area.

4) Other Crops

Other crops for which fertilizer is used consist of vegetables, tabacco and coconuts and the amount applied is negligible.

(6) Use of Fertilizer and Agricultural Chemicals in Farm Management

A breakdown of production costs required to produce 5t/ha of rice on the model irrigated paddy field under the Masagana 99 Program is as presented in TABLE 2-8, including labor, fertilizer, agricultural chemicals, seeds, and constant cost. According to this table, 200kg of mixed fertilizer (14-14-14) and 100kg of urea (45-0-0) are consumed (total nitrogen content: 78kg). Production costs are ₱9,800 of which agricultural chemicals comprise ₱775, and the benefit-cost ratio per 5t of rice (approximate income: ₱16,750) is 1.9.

(7) Supply of Fertilizer

As shown in TABLE 2-9, three manufacturing companies supply fertilizers. The capacity utilization rate for each company however, is low. The main reasons for this are deterioration of, or outdated, manufacturing plants, insufficient availability of raw materials from domestic sources and inability to compete with imported materials.

COST OF PRODUCTION PER HECTARE
MASAGANA 99-IRRIGATED DRY SEASON

NOVEMBER 6, 1984

ASSUMPTIONS

I. LABOR

Seed Preparation	3 MAD
Land Prepartion	25 MAD
Pulling & Transplanting	20 MD
Repair of Dikes	3 MD
Weeding	8 MD
Fetilizer Application	4 MD
Chemical Application	4 MD
Harvesting & Threshing	14.00% of gross production
Drying & Hauling	₱1.00/cav (famer's share)
Wage Rates (₱)	45.70 per Man Animal Day (MAD) 27.40 per Man-Day (MD)

II. MATERIAL INPUTS

Seeds	100kg(s) at ₱4.00/kg
Fertilizer	Based on general recommendation of: 4.0 bag(s) of 14-14-14 at ₱270.63/bag 2.0 bag(s) of Urea at ₱296.15/bag
Pesticides/Chemicals	Based on recommended package under Integrated Pest Management which estimates the requirements at 60% of the general requirements.

III. FIXED COSTS

Interest on Loan	5.00% of production loan computed at 15% interest rate oper annum at 120 days maturity period
Land Amortization	Bsed on MAR amoritization values of 1981 at ₱1,160.00 per annum or ₱580.00 per 6 months cropping period for irrigated lands.
Land Tax	₱36.00 per annum or ₱18.00 per 6 month cropping period for irrigated lands.
SN Fees (voluntary contributions):	
BGF	1.0 cavan(s)/cropping
BSF	3.0% of production loan
Crop Insurance	2.0% of 125.00% of production loan
Irrigation Fee	3.00 cavan(s) during dry season
Production Loan	₱3,000/cropping

COST OF PRODUCTION PER HECTARE
MASAGANA 99-IRRIGATED DRY SEASON

I.	LABOR		
	Seedbed Preparation	₱	137
	Land Preparation		1143
	Pulling and Transplanting		548
	Repair of Dikes		82
	Weeding		219
	Fertilizer Application		110
	Chemical Application		110
	Harvesting Threshing		2030
	Drying and Hauling		86
	Sub-Total		4465
II.	MATERIAL INPUTS		
	Seeds		400
	Fertilizer		1675
	Pesticides/Chemicals/Rodenticides		775
	Sub-Total		2850
III.	FIXED COSTS		
	Interest on Loan		150
	Land Amortization		580
	Land Tax		18
	SN Fees: BGF		145
	BSF		90
	Crop Insurance		75
	Irrigation Fee		435
	Depreciation		200
	Sub-Total		1693
	TOTAL COST OF PRODUCTION (₱)		9008
	POTENTIAL YIELD (cavan)		100
	SUPPORT PRICE (₱/kg)		3.35
	GROSS INCOME (₱)		16750
	NET INCOME (₱)		7742
	ROI (%)		85.95
	BREAKEVEN YIELD (cavan)		53.78
	BREAKEVEN PRICE (₱/Kg)		1.80

FERTILIZER PRODUCTION RECORD
(Company Name: Planters Products, Inc.)

(Unit: MT)

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
A. INTERMEDIATE PRODUCTS										
Ammonia	54,805	56,215	45,518	30,648	33,434	40,390	39,039	39,419	18,056	24,756
Sulfuric Acid	182,915	136,246	137,192	133,171	120,453	139,759	117,008	74,043	61,758	84,450
Phosphoric Acid	46,505	33,428	28,866	28,257	29,928	32,892	31,710	34,243	18,287	20,781
B. SINGLE NUTRIENT PRODUCTS										
Urea	12,048	24,460	14,098	0	296	0	0	0	0	0
C. COMPOUND (NP/NPK) PRODUCTS										
12-12-12	0	5,346	2,601	6,841	10,213	0	0	0	0	0
14-14-14	0	47,062	77,292	44,455	112,517	89,342	107,126	116,368	93,682	110,646
18-46-0	8,175	15,402	1,041	716	0	0	0	0	0	0
16-20-0	175,865	72,717	73,597	91,889	57,333	97,788	73,592	74,986	17,664	19,626
Total	184,040	140,527	154,531	143,901	180,063	187,130	180,718	191,354	111,346	130,272

TABLE 2-9
(1 of 3)

FERTILIZER PRODUCTION RECORD

(Company Name: Atlas Fertilizer Corp.)

(Unit: MT)

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
A. INTERMEDIATE PRODUCTS										
Sulfuric Acid	16,024	30,044	42,178	15,013	27,047	2,439	19,227	30,984	0	0
Phosphoric Acid	3,275	5,214	5,524	4,230	6,248	4,649	6,557	5,835	1,761	4,340
B. SINGLE NUTRIENT PRODUCTS										
Ammonium Sulfate	49,701	70,956	86,524	53,926	63,591	8,638	3,900	37,093	0	0
Single Super Phos.	3,533	2,469	540	1,113	2,020	806	3,311	4,993	4,119	2,863
C. COMPOUND (NP/NPK) PRODUCTS										
12-12-12	12,920	5,118	10,810	8,204	6,499	4,013	4,610	2,064	0	1,792
14-14-14	6,852	5,856	6,045	11,534	25,157	20,319	30,848	21,711	9,437	6,964
16-20-0	2,410	17,392	13,643	9,119	15,301	14,762	9,083	12,689	1,374	14,648
6-10-4	0	0	0	460	0	0	0	0	0	1,053
10-5-25	2,564	137	353	264	0	532	0	12	0	0
6-9-15	0	0	3,048	0	0	0	0	933	950	0
Total	24,746	28,503	33,899	29,581	46,957	39,626	44,541	37,409	11,761	24,457

TABLE 2-9
(2 of 3)

TABLE 2-9
(3 of 3)

FERTILIZER PRODUCTION RECORD

(Company Name: Maria Cristina Fertilizer Corp.)

(Unit: MT)

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
A. INTERMEDIATE PRODUCTS										
Ammonia	11,619	11,421	7,222	4,597	0	0	0	0	0	0
Sulfuric Acid	29,903	25,985	15,537	10,810	0	0	0	0	0	0
B. SINGLE NUTRIENT PRODUCTS										
Ammonium Sulfate	29,787	30,535	15,674	10,199	0	0	0	0	0	471

(8) Marketing and Distribution of Fertilizer

1) General Marketing Channels

The marketing channels of fertilizer are depicted schematically in FIG. 2-6. The FPA classifies those engaged in fertilizer distribution into four categories, namely importers/producers, distributors, dealers, and outlets, as shown in FIG. 2-7, but the actual system deviates to some extent from the typical system shown in FIG. 2-6.

Most fertilizer in the Philippines is imported. Import regulations limiting import to 4 companies date back to 1976. In August 1984, however, this system was liberalized in order to introduce competition. Prior to complete liberalization, import allocations already made for four companies were respected until such time as a company defaults in opening the letter of credit.

In accordance with the above and failure to open a letter of credit by the four companies, PITC and New Agrix were licensed for importation in 1984. With the involvement of these two companies, the government became involved in fertilizer imports for the first time.

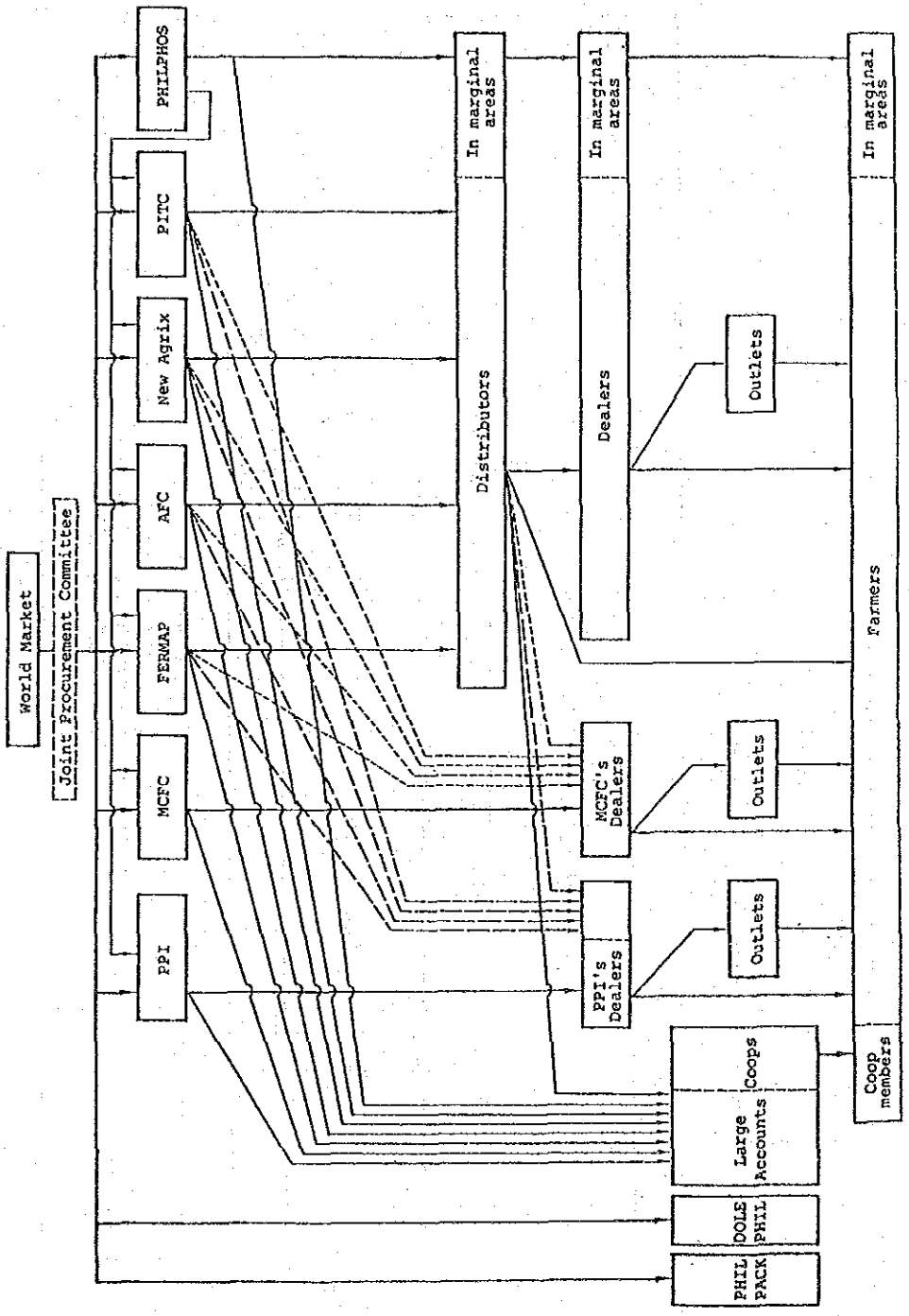
Importers have warehouses in major distribution centers around the country, and deliver fertilizer to distributors at the warehouses. Distributors are at the second level of fertilizer distribution next to importers/producers. Their function is basically wholesaling, and selling to dealers. The number and location of distributors registered in FPA is given in TABLE 2-10.

Dealers basically function as retailers. The number of dealers/outlets licensed by FPA is shown in TABLE 2-11. The number of dealers/outlets decreased during the 4 years from 1980 through 1984, except for Ilocos and Cagayan Valley.

In the case of the Increased Food Production Program the government sector is represented by the National Food and Agriculture Council (NFAC), the implementing agency, while

FIG. 2-6

MARKETING FLOW OF FERTILIZER IN THE PHILIPPINES



TYPICAL STEPS OF MARKETING/DISTRIBUTION OF FERTILIZER

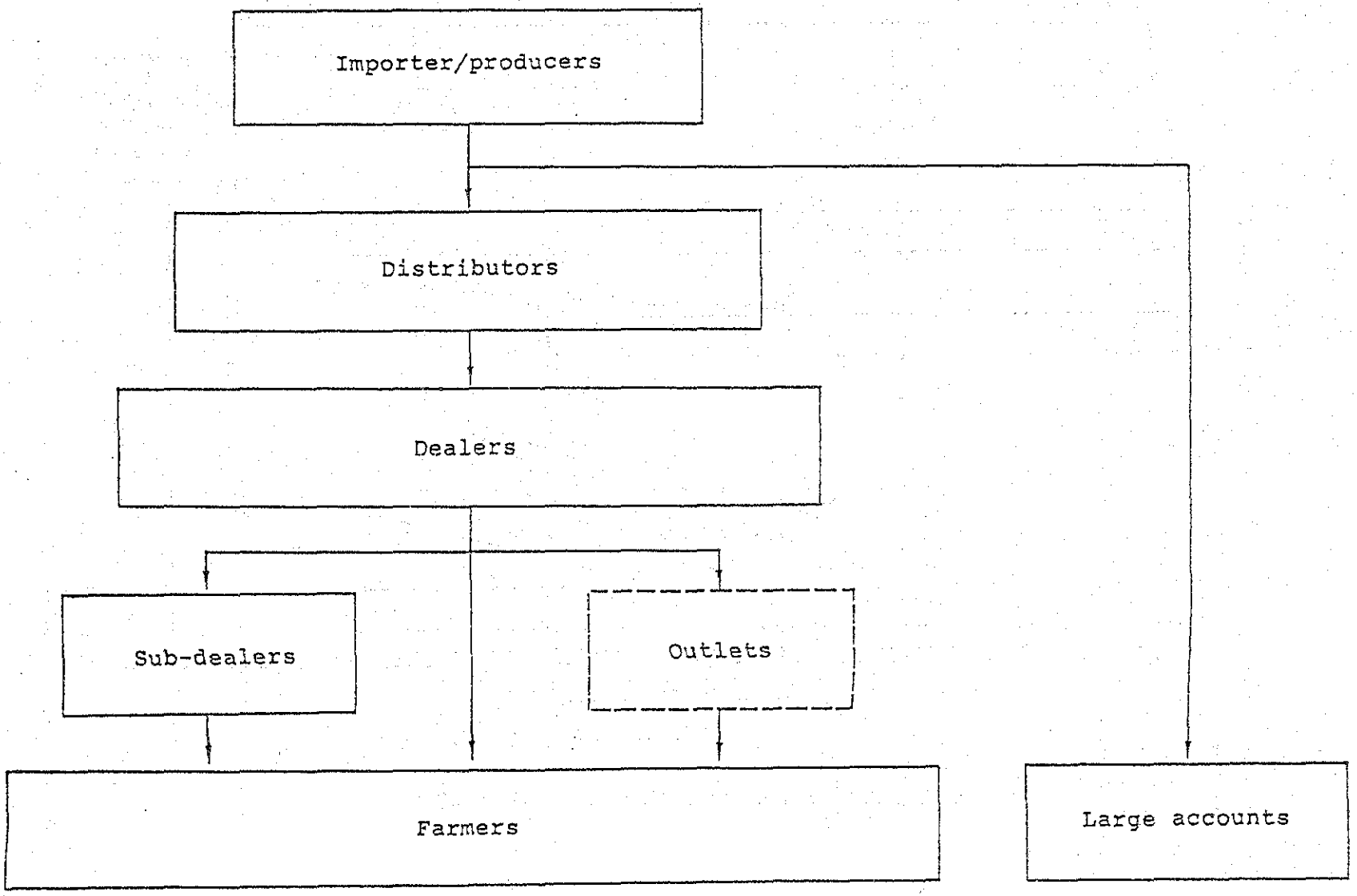


FIG. 2-7

TABLE 2-10

NUMBER AND LOCATION OF LICENSED DISTRIBUTORS BY COMPANY

Company	Luzon	Visayas	Mindanao	Total
AFC	23	12	11	46
PPI*1	11	4	8	23
MCFC	5	3	2	10
FERMAP	8	1	4	13
NEWAGRIX			1	1
PITC	1			1
RSS			2	2
AGRICON			1	1
MANCHEM	1			1
UCPI	1			1
TOTAL	50	20	29	99

Notes: RSS ..... Organic fertilizer only.
Agricon ... Liquid fertilier only.
Manchem ... Soil condition only.

*1 PPI categorizes these distributors as dealers together with other PPI's dealers.

Source: FPA

TABLE 2-11

NUMBER OF DEALERS/OUTLETS BY REGION

Regions	As of May 31, 1980	As of December 31, 1984
Ilocos	261	356
Cagayan V.	174	281
C. Luzon	524	370
S. Tagalog	461	279
Bicol	225	154
Luzon Total	1,645	1,440
W. Visayas	429	291
C. Visayas	215	142
E. Visayas	88	49
Visayas Total	732	482
W. Mindanao	86	59
N. Mindanao	239	186
E. Mindanao	267	215
S. Mindanao	244	171
Mindanao Total	836	631
Grand Total	3,213	2,553

the private sector is represented by fertilizer distributors such as Planters Products Inc., Fertilizer Marketing of the Philippines, etc. (FIG. 2-8).

Before the arrival of the shipments, the NFAC is informed by the supplier of the expected arrival date. In turn the NFAC sends the necessary letters to the Fertilizer and Pesticide Authority (FPA) requesting the FPA Import Certificate; to the Central Bank of the Philippines (CB) for the CB Release Certificate; to the Ministry of Finance requesting deferred payment of the customs duties and taxes; and to the shipping lines for processing of the shipping documents and the immediate delivery of commodities to the warehouse.

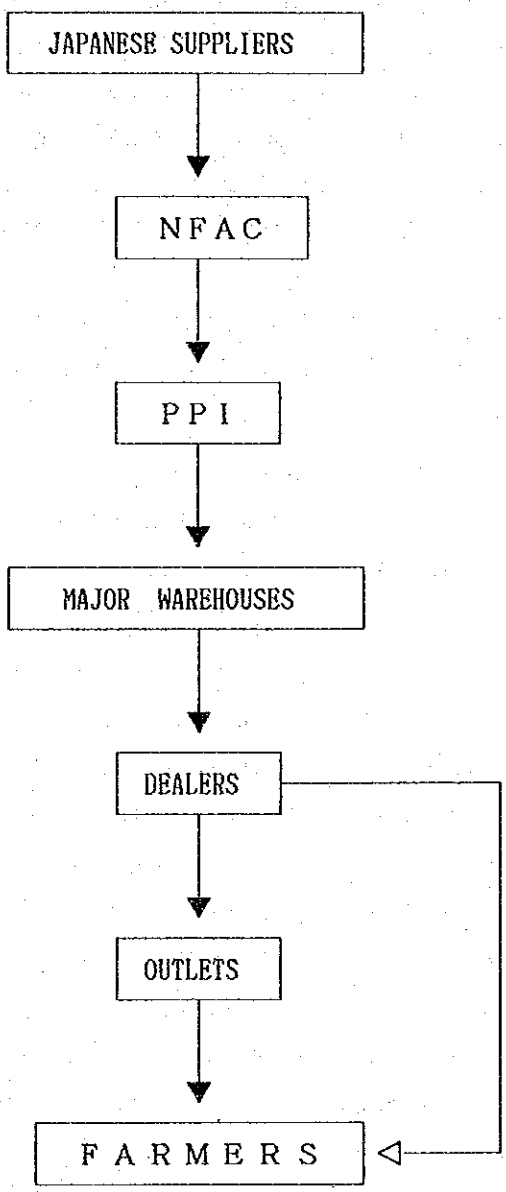
The distributor is responsible in the receipt of the commodities from the vessel and the expenses related thereto. Said expenses include wharfage, brokerage, delivery and handling, warehousing, demurrage, broker and customs charges.

Imported/granted fertilizers are received in landing ports throughout the country depending on pier accommodations, warehousing capacities, barge availability and location of demand; however, the Manila port is usually utilized in the unloading of most technical grade agricultural chemicals for further formulation.

Distribution from port of landing to major company warehouses and subsequently to distributors and/or dealers/outlets, is carried out by different modes of sea and land transportation. A survey revealed that 45% of fertilizer stock was moved by trucks and other land transportation and 55% by means of barges and other sea transportation.

FPA recognizes the prerogative of the fertilizer and pesticide companies to establish their own dealer/distribution network. As PPI holds 64% of shares in imported fertilizers, fertilizers imported under the

FERTILIZER FLOW OF RP-JAPAN FOOD PRODUCTION PROGRAM



Increased Food Production Program are stored in PPI warehouses and are used for rice cultivation under the Intensified Rice Production Program (IRPP). The latter program is a part of Masagana 99 and includes both financial and technical assistance. The main features of this program are application to irrigated areas only and introduction of the private sector in funding.

(9) Future Demand for Fertilizer

1) Projection 1

Future demand was projected at three levels, namely, recommended level, economic potential level, and achievable level. The recommended level means the level which will be realized if all farmers follow the recommended application level. The recommendation is generally understood to have been set at the economically optimum level. However, some recommendations are not necessarily set at this level. As shown in TABLE 2-12, the recommended level is higher than that of the economic optimum level at the present price ratio.

Economic optimum level will change in accordance with changes in either fertilizer price or crop price as well as changes in stability of yield. The economically potential demand was projected at the level of 2.0 of output/input ratio. However, farmers are actually applying fertilizer at levels higher than ratio.

The achievable level was projected using the output/input ratio which farmers are following at present, with assumption that this ratio will be improved gradually in accordance with improvement in stability of yield or development of cultivation infrastructure.

The achievable demand reflects the actual consumption in the past, while two other projections represent the potential levels. The expected demand will change in accordance with changes in output/input ratio.

TABLE 2-12
(1 of 3)

PROJECT DEMAND FOR FERTILIZER (1)

-- NITROGEN FERTILIZER --

(Unit: N'000 ton)

	Actual			Projected		
	1974	1979	1983	1985	1990	1995
Projection 1						
Recommended level						
Palay	270.2	298.7	259.2	283.9	285.9	289.8
Corn	118.5	292.7	284.4	305.4	316.9	323.8
Sugarcane	58.2	55.6	52.1	54.0	50.9	47.5
Others	206.7	307.5	315.0	355.6	388.6	416.0
Total	653.6	954.5	910.7	998.9	1042.3	1077.1
Economic potential level						
Palay			207.0	224.8	227.8	232.2
Corn			104.5	110.5	111.2	110.9
Sugarcane			42.7	53.9	48.9	43.1
Others			36.9	21.3	23.3	25.0
Total			391.1	410.5	411.2	411.2
Achievable level						
Palay	84.9	129.3	128.6	150.5	163.0	169.6
Corn	9.3	29.4	18.5	24.4	25.4	25.9
Sugarcane	69.9	68.3	60.0	64.3	60.6	56.5
Others	13.4	15.7	36.9	21.3	23.3	25.0
Total	177.5	242.7	244.0	260.5	272.3	277.0
Urea	97.6	147.2	170.9	183.3	191.6	194.4
Amm.Sul./Amm.Chl.	41.7	36.8	30.0	31.9	33.4	34.0
NPK	18.1	23.8	20.8	43.0	45.0	45.7
NP&P	20.1	34.9	22.5	2.2	2.4	2.8
Total	177.5	242.7	244.0	260.5	272.3	277.0

TABLE 2-12
(2/3)

PROJECTED DEMAND FOR FELTILIZER (1)

-- PHOSHATE FERTILIZER --

(Unit: N'000ton)

	Actual			Projected		
	1974	1979	1983	1985	1990	1995
Projection 1						
Recommended level	188.8	389.9	380.0	415.2	434.0	449.4
Achievable level	47.7	51.9	54.7	54.0	56.5	58.5
NPK	20.0	18.3	20.8	48.3	50.5	51.3
NP&P	27.7	33.6	33.9	5.7	6.0	7.2
Total	47.7	51.9	54.7	54.0	56.5	58.5
Projection 2	47.7	51.9	54.7	61.0	66.0	70.1

TABLE 2-12
(3 of 3)

PROJECTED DEMAND FOR FERTILIZER (1)

-- Potassium Fertilizer --

(Unit: N'000ton)

	Actual			Projected		
	1974	1979	1983	1985	1990	1995
Projection 1						
Recommended level	651.0	561.3	563.0	618.9	663.4	699.6
Achievable level	60.0	63.7	64.5	74.3	92.9	105.0
NPK	18.3	17.4	20.9	22.3	23.4	23.7
MOP	40.8	41.8	40.3	48.2	64.4	75.4
SOP	N.A	N.A	3.2	3.8	5.1	6.0
Total	60.0	63.7	64.5	74.3	92.9	105.0
Projection 2	60.0	63.7	64.5	75.7	95.2	108.1

2) Projection 2

Generally, changes in the cultivation area of crops reflect the market situation of crops and agricultural policy directions. There is no firm long term target for food production at present. The basic agricultural target is to achieve and maintain self-sufficiency in rice, and reduce the import requirement of corn. Demand projection 2 (TABLE 2-13) was calculated quantifying these policy targets and projecting the required cultivation area. TABLE 2-14 and 2-15 give the projected balance of supply/demand of palay and corn corresponding to the above target, and show the required hectarage to achieve the target which was calculated by quantifying these policy targets and projecting the required cultivation area.

3) Projection 3

The Azolla promotion program is now under implementation. If this program is successful, the demand for nitrogen fertilizer will not increase as projected in the above projections. Projection 3 estimates the future demand with some substitute of nitrogen demand by Azolla. The substitution is assumed only for climatic types II and IV with 10% of potential nitrogen demand from palay in 1990 and 20% in 1995.

2.3.2 Use of Agricultural Chemicals in the Philippines

(1) General

The yield loss ratio of crop production due to damage from insects, diseases, weeds and rodents in the Philippines is estimated to be between 30% and 40%. The outbreak of insect pests depends on various factors such as region, season and chronology, which make it extremely difficult to generalize or quantify, and in some cases even make it appear as though the results of tests in different areas are contradictory. Harvest loss from insect pests however, is considerable. From tests conducted by the

TABLE 2-13

PROJECTED DEMAND FOR FERTILIZER (2)

-- Nitrogen Fertilizer (2) --

(Unit: N'000ton)

	Actual			Projected		
	1974	1979	1983	1985	1990	1995
Projection 2						
Palay	84.9	129.3	128.6	176.0	205.8	229.6
Corn	9.3	29.4	18.5	31.1	33.6	36.8
Sugarcane	69.9	68.3	60.0	64.3	60.6	56.5
Others	13.4	15.7	36.9	21.3	23.3	25.0
Total	177.5	242.7	244.0	292.7	323.3	347.9
Projection 3						
Palay	84.9	129.3	128.6	150.5	157.7	158.7
Corn	9.3	29.4	18.5	24.4	25.4	25.9
Sugarcane	69.9	68.3	60.0	64.3	60.6	56.5
Others	13.4	15.7	36.9	21.3	23.3	25.0
Total	177.5	242.7	244.0	260.5	267.0	266.1
Projection 4						
Urea	97.6	147.2	170.9	158.2	167.8	171.4
Amm.Sul./Amm.Chl.	41.7	36.8	30.0	57.1	57.1	57.1
NPK	18.1	23.8	20.8	43.0	45.0	45.7
NP&P	20.1	34.9	22.5	2.2	2.4	2.8
Total	177.5	242.7	244.0	260.5	272.3	277.0

PAST TREND AND PROJECTION OF PALAY PRODUCTION

	Required Rice	Required Production of Palay	Irrigated						Reinfed					
			MYV			LV			MYV			LV		
			Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production
	('000ton)	('000ton)	(kg/ha)	('000ha)	('000ton)	(kg/ha)	('000ha)	('000ton)	(kg/ha)	('000ha)	('000ton)	(kg/ha)	('000ha)	('000ton)
Actual														
1977/78	4,243	6,630	2.75	1,337	3,753	1.94	183	354	1.74	1,146	1,996	1.33	467	622
1978/79	4,522	7,011	2.89	1,345	3,882	2.14	162	348	1.85	1,225	2,258	1.42	400	568
1979/80	5,058	7,782	2.93	1,430	4,189	2.26	176	398	1.84	1,279	2,350	1.39	377	525
1980/81	5,264	8,098	2.90	1,434	4,153	2.07	190	392	1.97	1,240	2,444	1.39	345	478
1981/82	5,090	7,831	3.03	1,538	4,655	2.24	161	360	2.03	1,218	2,467	1.40	285	400
1982/83	5,091	7,809	3.00	1,646	4,925	2.29	117	268	1.91	1,083	2,065	1.33	237	316
Projected (Assuming self-sufficiency)														
	*1	*1	*2	*3		*2	*3		*2	*3		*2	*3	
1984/85	5,460	8,336	3.08	1,717	5,288	2.29	117	268	1.97	1,269	2,500	1.29	218	281
1989/90	6,538	9,986	3.30	2,021	6,669	2.29	85	195	2.11	1,356	2,861	1.21	149	180
1994/95	7,336	11,032	3.52	2,181	7,677	2.36	72	170	2.22	1,381	3,066	1.21	102	123

Notes: *1 See Table 2-3
*2 Projected by IFPRI Study.
*3 Calculated with following formula:

$$A_i = A_{io} \times (P_r / P_{io})$$

where, A_i = Projected area for Category i
A_{io} = Area for Category I projected on past trend
P_r = Required production of palay
P_{io} = Production from Category i projected on A_{io}

PAST TREND AND PROJECTION OF CORN PRODUCTION

	Required Production ('000ton)	Yield (ton/ha)	Area ('000ha)	Production ('000ton)
Actual				
1977/78	2,931	0.89	3,158	2,796
1978/79	3,035	0.95	3,252	3,090
1979/80	3,332	0.98	3,201	3,123
1980/81	3,434	0.96	3,239	3,110
1981/82	3,568	0.98	3,361	3,290
1982/83	3,534	0.99	3,157	3,126
Projected (Assuming self-sufficiency)				
	*1	*2	*3	
1984/85	3,998	1.03	3,882	3,998
1989/90	4,824	1.15	4,195	4,824
1994/95	5,859	1.27	4,613	5,859

Notes: *1 See Table 2-4
*2 Projected by IFPRI Study, assuming yield grwoth at trend-based.
*3 Calculated so as to be able to achieve required production.

International Rice Research Institute (IRRI) over three crop seasons between 1972 and 1973 covering 15 families, the following conclusions may be drawn:

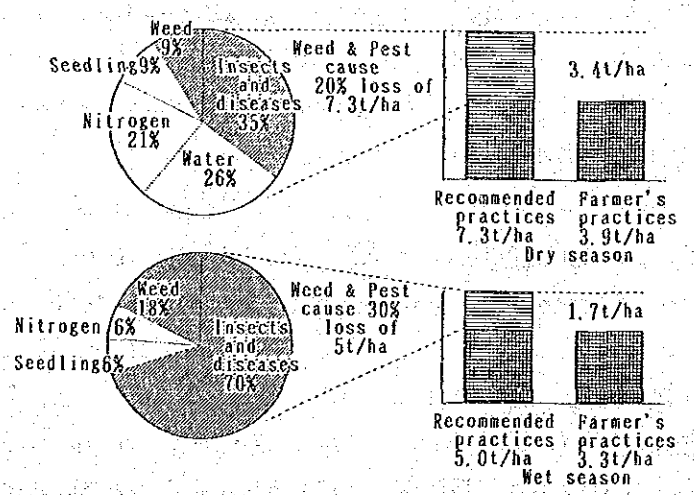
a) The difference in yields between the IRRI cultivation method and the traditional method of farming was 3.4t/ha during the dry season and 1.7t/ha during the wet season.

b) The main factor in the yield difference during the dry season was pest damage, which accounted for 44% of the difference. The yield loss ratio out of a harvest of 5.0t/ha was about 20%.

c) The main factor in the yield difference in the rainy season was pest damage which accounted for some 88% of the difference.

d) As it may be assumed that some pest damage control is practiced in the traditional cultivation method, if the yield loss ratio is applied to yield from a field where no pest damage control is practiced, the ratio is expected to rise by 5 to 10%, so that the yield loss ratio from pest damage may be estimated at 25 to 40%.

RICE LOSSES DUE TO PESTS



Difference between yields when farmers follow their usual practices and when they follow IRRI recommendations. Factors which constrain yields in farmers fields are shown in the circles. Data taken on a total of 15 farms over three crop seasons, 1972-3. Laguna Province, Philippines. Source : IRRI Research Highlights for 1973.

Under present circumstances, the cheapest and most effective method of reducing loss from pest damage is use of chemical application. Whereas fertilizers aim at increasing productivity, chemicals aim at reducing the factors which lower yields. The effect of chemicals is at times even greater than the effect of fertilizer and thus they are indispensable for agricultural production.

(2) Agricultural Chemical Imports

Imports of formulated and technical grade agricultural chemicals in the last six years are shown in TABLE 2-16 and FIG. 2-9 and 2-10. Imports had been increasing gradually from 1960, and with the start of Masagana 99, the Philippine Increased Rice Production Program, in 1972 they began to increase more rapidly. However, from 1983 due to unseasonable weather, high inflation rate, soaring agricultural chemical prices, devaluation of the peso, etc., the value of imports began to drop and from 1984, imports began to decrease in both quantity and value.

Imports of agricultural chemicals can be divided into technical grade chemical and formulated chemical imports. Import tax on technical grade chemicals is 15% which is lower than 25% for fourmulated chemicals. Furthermore the costs for domestic processing and adjusting are lower for technical grade chemicals. For these reasons, imports of technical grade chemicals are increasing. The projected ratio of agricultural chemical imports for 1985 is 60% for technical grade chemicals and 40% for formulated chemicals.

The ratio of costs for importing technical grade and formulated chemicals is 46% for insecticides, 16% for herbicides, 29% for fungicides, and 9% for nemacides, etc. US$1,500 million or 45% of the total cost for agricultural chemical imports in 1984 was provided by the International Bank for Reconstruction and Development (World Bank), US$1,270 million or 38% by the Asian Bank and the remaining US$580 million or 17% by bilateral aid.

TATAL IMPORTATION OF PESTICIDES (1980-85)

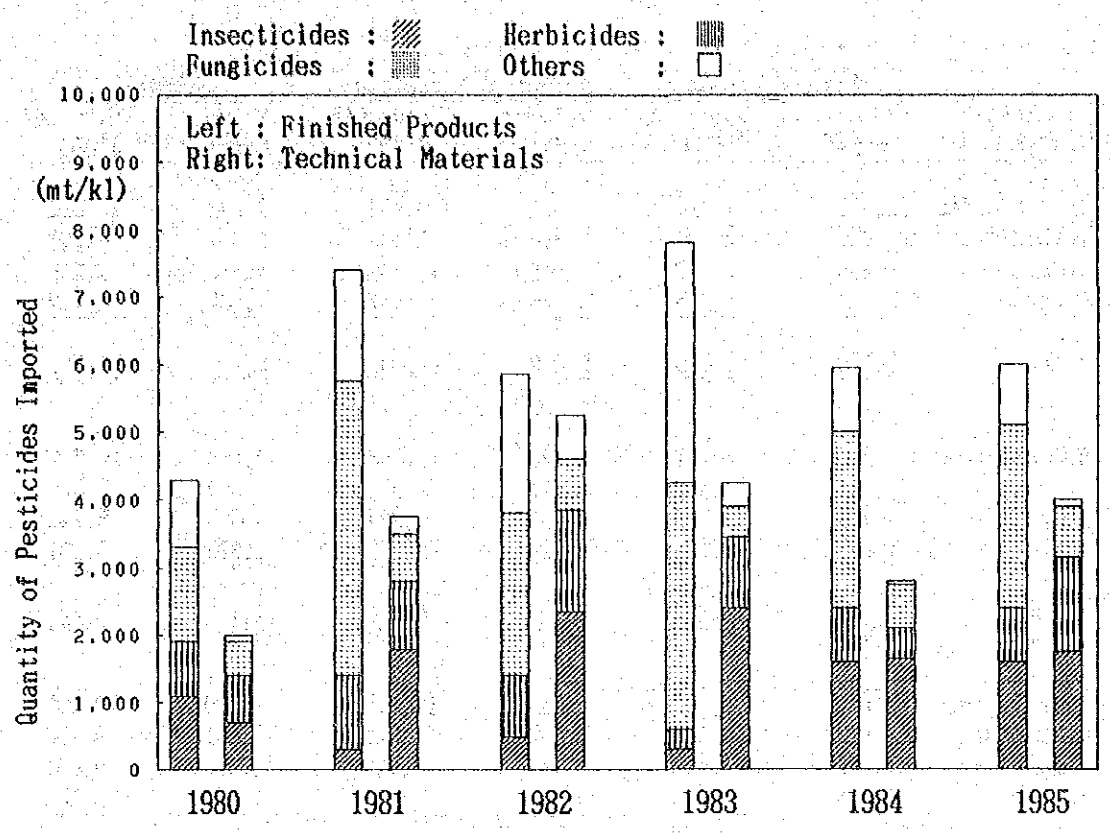
Year	Pesticide Type	Finished Products Volume mt/kl	Finished Products Value C&F $'000	Technical Materials Volume mt/kl	Technical Materials Value C&F $'000	Total Volume mt/kl	Total Value C&F $'000
1980	Insecticides	1,090	2,376	633	9,706	1,723	12,082
	Herbicides	830	2,409	784	1,882	1,614	4,291
	Fungicides	1,298	2,990	519	258	1,817	3,248
	Others	1,028	1,865	76	557	1,104	2,422
	Total	4,246	9,640	2,012	12,403	6,258	22,043
1981	Insecticides	340	2,711	1,828	11,858	2,168	14,569
	Herbicides	1,044	3,310	1,015	2,310	2,059	5,620
	Fungicides	4,349	4,815	659	3,327	5,008	8,142
	Others	1,701	2,866	224	1,065	1,925	3,931
	Total	7,434	13,702	3,726	18,560	11,160	32,262
1982	Insecticides	430	3,498	2,320	15,600	2,750	19,098
	Herbicides	977	4,685	1,524	4,422	2,501	9,107
	Fungicides	2,328	4,749	742	5,102	3,070	9,851
	Others	2,126	3,009	338	2,380	2,464	5,389
	Total	5,861	15,941	4,924	27,504	10,785	43,445
1983	Insecticides	296	1,554	2,396	14,642	2,692	16,196
	Herbicides	258	1,081	1,032	2,556	1,290	3,637
	Fungicides	3,658	6,688	467	2,370	4,125	9,058
	Others	3,533	5,245	312	2,146	3,845	7,391
	Total	7,745	14,568	4,207	21,714	11,952	36,282
1984 (Projected)	Insecticides	1,582	3,875	1,660	11,625	3,242	15,500
	Herbicides	787	3,120	436	2,080	1,213	5,200
	Fungicides	2,615	4,682	673	5,115	3,288	9,797
	Others	960	2,400	80	600	1,040	3,300
	Total	5,944	14,077	2,849	19,420	8,893	33,497
1985 (projected)	Insecticides	1,605	4,688	1,714	14,076	3,319	18,764
	Herbicides	790	3,330	444	2,220	1,234	5,550
	Fungicides	2,699	4,759	765	5,816	3,464	10,575
	Others	840	2,100	70	525	910	2,625
	Total	5,934	14,877	2,993	22,637	8,927	37,514

Source: Summary Report, "Recommendation and Conclusion of Pesticide consultants" July 15, 1985

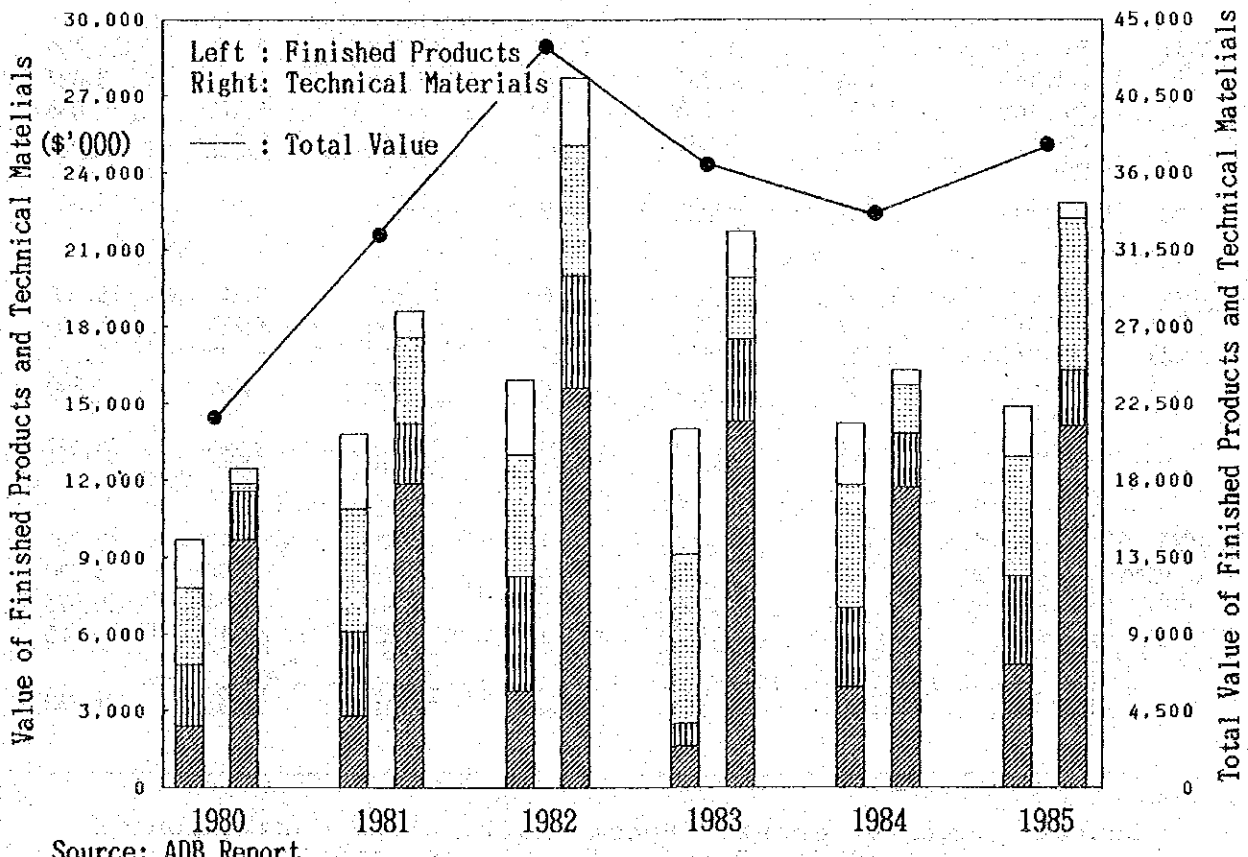
FIG. 2-9

FIG. 2-10

QUANTITY OF PESTICIDES IMPORTED



VALUE OF PESTICIDES IMPORTED



Source: ADB Report

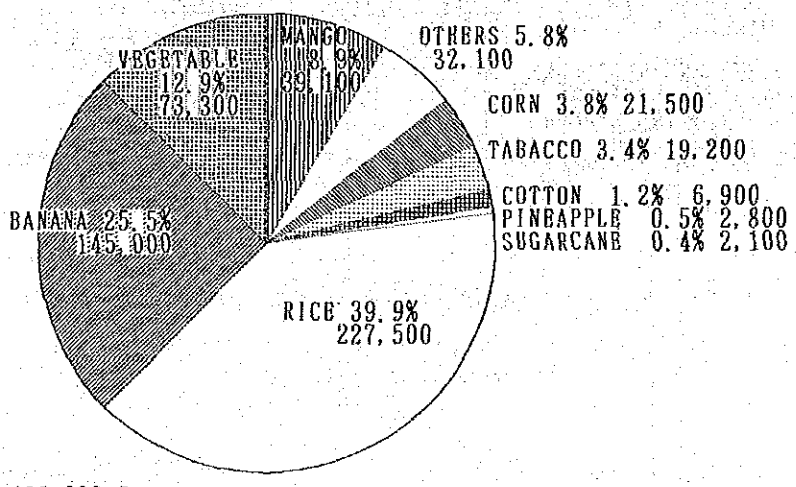
Note : Data of 1984 and 1985 are projected. All figured are C&F value.

(3) Agricultural Chemical Demand

Sales of agrochemicals in the Philippines in 1984 totalled approximately US$70 million or about 24,000t of end products. With commencement of Masagana 99 in 1973, consumption of agrochemicals rapidly inoreased; however, as mentioned above, consumption dropped after 1983.

The largest percentage of chemicals is used for rice, banana and vegetable crops at 40%, 26% and 13%, respectively as shown in the figure below. Agrochemicals consumption for corn was comparatively low at about 4%.

AGROCHEMICAL MARKET BY CROP OUTLETS
1983(EX-STOCK SALES IN THOUSAND PESOS)

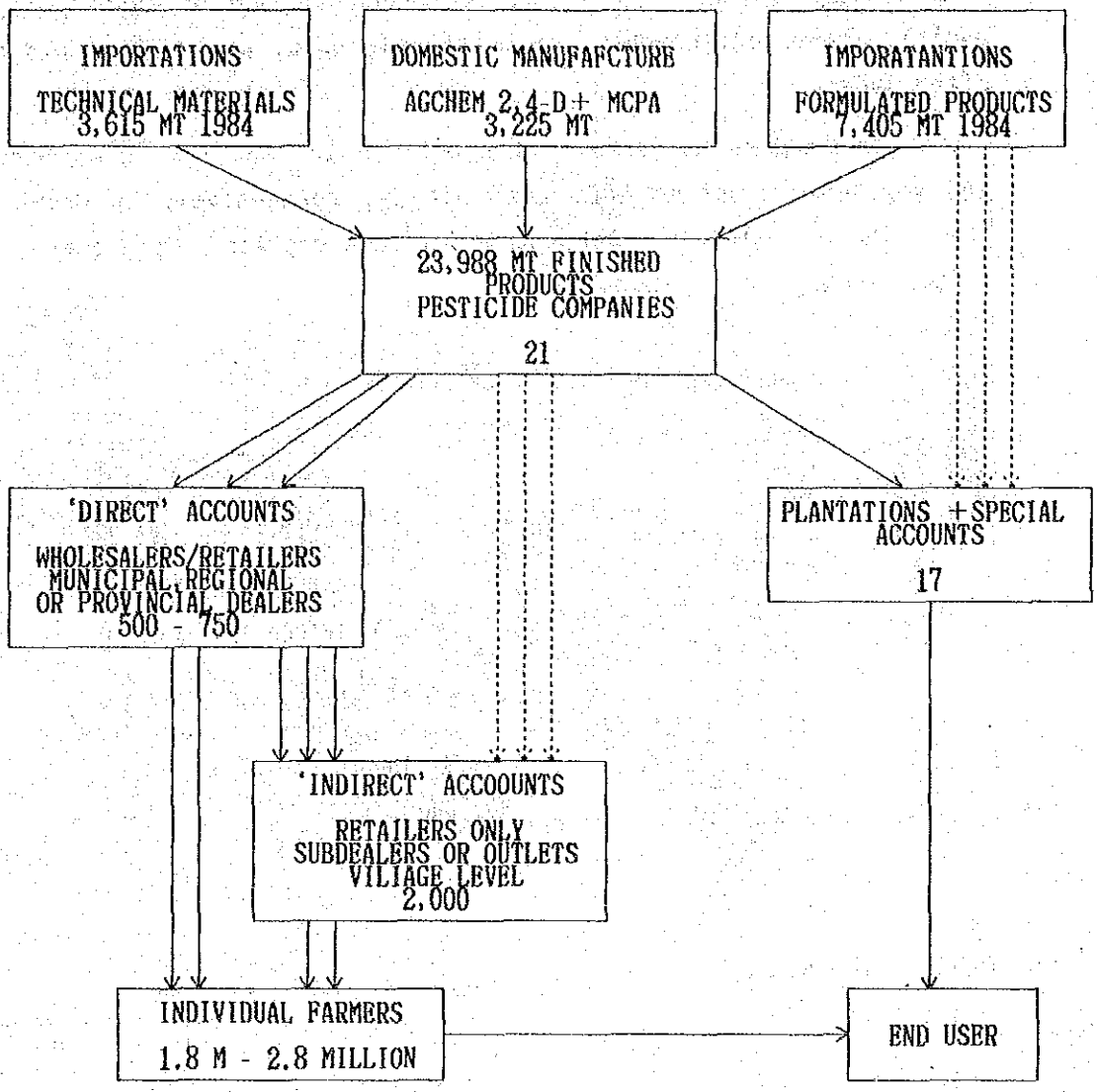


TOTAL : 587,400,000 Pesos

(4) Circulation Route and Market Value of Agricultural Chemicals

Except for herbicides manufactured from imported semi-manufactured chemicals by Agchem Manufacturing Corp. all chemicals are imported and processed by 21 agricultural chemical companies. The chemicals are then channelled through wholesalers and retailers before reaching the farmer. A rough outline of the circulation route is shown in FIG. 2-11.

PESTICIDE SUPPLY AND DISTRIBUTION CHANNELS



These 21 agricultural chemical companies form the Philippine Agricultural Chemical Association (APIP), assuming responsibility for the efficient distribution of agricultural chemicals. Members of APIP are listed in TABLE 2-17 with the names of raw material suppliers relevant to each company. TABLE 2-18 indicates the sales value, market share, type of agricultural chemical sold, and number of employees.

Where fertilizer costs are controlled by ceiling prices fixed by the Fertilizer and Pesticide Authority (FPA), agricultural chemical prices are determined by a completely free market. However, in the event of the following, the FPA is given certain authority to intervene in the market as set forth in Presidential Decree No. 1144.

1. Extreme hiking of prices without adequate reason.
2. Extreme shortage of supply.
3. Impending danger.

The FPA is committed to constantly survey and supervise the market price of agricultural chemicals. TABLE 2-19 shows the price of agricultural chemicals more than doubling between November 1983 and 1985. Where the peso was steady at approximately ₱8 to the US dollar until 1982, it was drastically devalued to ₱14 to the dollar in 1983 and to ₱19.5 to the dollar in 1984.

(5) Present Pest Situation and Pest Control Organizations

Rice yield loss due to pests is as high as 25 to 40%. The main insects are the plant hopper, leaf hopper, army worm and stemborer and the main diseases are tungro, bacterial leaf blight and rice blast. The main paddy weeds are wild blight (Echinochloa crusgalli) and sedge (Cyperus iria, Cyperus difformis).

Major insect pests for corn are corn borers, army worms, cut worms, and whorl maggots, while diseases are downy mildew and stalk rot. The major insect pests and weeds which affect rice and corn are summarized in the following table.

APIP MEMBERS AS OF 1 JANUARY 1984

	Local Company	Supplier
1.	Shell Philippines, Inc.	Shell International Chemical Company Sumitomo, Japan Monsanto, USA Du Pont, USA Kakhteshim, Israel Nippon Kayaku, Japan
2.	Bayer Philippines, Inc.	Bayer, W. Germany Monsanto, USA Nitokuno, Japan Rohm & Haas, USA
3.	Planters Products, Inc.	Makhteshim, Israel Mitsubishi, Japan FMC. USA Takeda, Japan Velsicol, USA Dow, USA Farmoplant, Italy Cheminova, Denmark Choch, Taiwan
4.	Union Carbide Phil., Inc.	Union Carbide, USA Schering, W. Germany Korea Steel, Korea Ugine Kuhlmann, France Kumiai, Japan Nissan, Japan Diamond Shamrock, Japan
5.	Hoechst Philippines, Inc.	Hoechst, W. Germany Procida, France Pennwalt, Holland Cela-Merck, W. Germany Sandoz, Switzerland
6.	Ciba-Geigy Philippines, Inc.	Ciba-Geigy, Switzerland
7.	Asia Pacific Agricultural Development Co.	EMC, USA
8.	Warner Barnes & Co.	ICI, UK
9.	Cyanamid Philippines, Inc.	Cyanamid, USA; Taiwan
10.	Marsman & Company	Velsicol, USA Mahkteshim, Israel BASF, W. Germany

TABLE 2-17
(2 of 2)

11.	BASF Philippines	BASF, W. Germany
12.	Rohm & Haas Philippines, Inc.	Rohm & Haas, USA: Italy; Brazil
13.	Agchem Manufacturing Corp.	Mitsubishi, Japan Dow, USA ICI, UK Rhone-Poulenc, France Nisso Iwai, Japan May & Baker, UK
14.	Du Pont Philippines, Inc.	Du Pont USA: Brazil Sandoz, France Dequiza, Spain
15.	Eisenberg Philippines, Inc.	Makhteshim, Israel
16.	Rhone-Poulenc Philippines, Inc.	Rhone-Poulenc, France
17.	Monsanto Philippines, Inc.	Monsanto, USA
18.	Dow	Dow
19.	Atlas	Chevron
20.	F.M.C	F.M.C
21.	Velsicol	Velsicol

1984 APIP MEMBERS MARKET SHARE & STAFF

COMPANY	MARKET VALUE	SHARE %	NO. OF AGRI. PESTICIDE REGISTERED PRODUCTS	AGROCHEMICAL STAFF				
				AGRONOMIST DEMONSTRATORS	SALES REP.	PRO. DEV.	MNGRS. SUPERVISOR	TOTAL
SHELL	P207M	25.10%	46	27	36	5	7	55
BAYER	P186M	22.00%	20	27	21	1	10	59
PLANTERS	P147M	17.81%	26	-	68	6	16	90
UNION C.	P108M	13.12%	21	20	15	3	5	43
HOECHST	P 80M	9.71%	21	22	16	5	5	48
C. GEIGY	P 37M	4.56%	10	16	15	4	5	40
MARSMAN	P 20M	2.53%	6	-	18	1	3	22
ROHM & H.	P 14M	1.69%	8	-	1	-	2	3
AGCHEM	P1.1M	.14%	16	-	-	1	2	3
DU PONT	P 6M	.74%	16	-	7	-	3	10
WARNER	P 10M	1.22%	15	4	3	1	3	11
TOTALS			205	116	180	27	61	384

TABLE 2-19

PRICES OF PESTICIDES, 1983-85

CO./PRODUCT	PACKING	NOV.83 PRICE	FEB. 84 (35% INC)	JUNE 84 EST.	TODAY'S LIST PRICE	ACTURAL PRICES LOW DIS- COUNT RATE		HIGH DIS- COUNT RATE	
SHELL									
AZODRIN 202R	1 LTR	108.80	146.88	158.45	207.57	152.00	27%	160.00	23%
DIAGRAN 5G	15 KG	190.80	257.58	291.45	299.70	220.00	27%	290.00	3%
SHELL 2,4D	1 LTR	60.00	81.00		112.80	77.00	32%	100.00	11%
LANNATE L	1 LTR	117.0	157.95		206.68	160.00	23%	175.00	15%
BENLATE 50 WP	100 GM	66.95	90.38		100.00	80.00	20%	95.00	5%
AVERAGE		108.71	146.76		185.35	137.80	26%	164.00	12%
HOECHST									
HOPCIN	1 LTR	71.50	96.53	146.36	176.70	134.30	24%	176.70	0%
THIODAN EC	1 LTR	70.00	94.50	144.19	185.60	141.10	24%	185.60	0%
HOSTATHION	1 LTR	174.00	234.90	274.55	343.90	261.40	24%	343.90	0%
AVERAGE		105.17	141.98	188.37	235.40	178.93	24%	235.40	0%
PLANTERS									
BRODAN	946 ML	109.80	148.34	246.87	180.00	167.50	7%	180.00	0%
FURDAN 3G	16.7 KG	225.00	303.75	454.93	453.00	421.30	7%	453.00	0%
CARBOPHEN 6G	17 KG	192.95	260.48	416.56	312.50	290.00	7%	312.50	0%
BIONEX	946 ML	95.00	128.25	255.70	218.95	208.00	5%	218.95	0%
CARVIL	946 ML	88.13	118.98	196.35	153.55	142.80	7%	153.55	0%
ENDOX EC	946 ML	81.88	110.54	203.90	170.00	161.50	5%	170.00	0%
TERCYL	500 GM	53.75	72.56	140.35	125.75	116.95	7%	125.75	0%
2,4D AMINE	946 ML	43.13	58.23	77.11	67.65	64.00	5%	67.65	0%
2,4D ESTER	946 ML	44.38	59.91	90.79	83.50	79.0	5%	83.50	0%
2,4D GRANULES	25 KG	103.13	139.23	155.91	144.55	137.00	5%	144.55	0%
FUNGITOX	120 GM	34.38	46.41	68.22	74.55	70.00	6%	74.55	0%
RATOXIN	1 KG	10.00	13.50	17.09	35.00	33.00	6%	35.00	0%
AVERAGE		90.13	121.68	193.65	168.25	157.59	6%	168.25	0%
CIBA-GEIGY									
NUVACRON 300	1 LTR	93.26	125.90	194.83	220.00	190.00	14%	230.00	-5%
BASUDIN 5G	15 KG	147.25	198.79	408.99	298.00	260.00	13%	298.00	0%
BASUDIN EC	1 LTR	46.14	62.29	110.04	171.00	140.00	18%	170.00	1%
RILOP H EC	1 LTR	105.55	142.49	245.46	253.00	230.00	9%	260.00	-3%
AVERAGE		98.05	132.37	239.83	235.50	205.00	13%	239.50	-2%
BAYER									
BAYCARB	1 LTR	71.50	96.53	139.79	178.50	151.73	15%	178.50	0%
ETROFOLAN	1 KG	78.00	105.30	129.21	179.00	152.15	15%	179.00	0%
BASAGRAN	500 ML	57.50	77.63	119.86	105.25	89.46	15%	105.25	0%
AVERAGE		69.00	93.15	129.62	154.25	131.11	15%	154.25	0%
UNION CARBIDE									
SEVIN XLR	1 LTR	64.00	86.40	127.31	170.85	145.22	15%	170.85	0%
SATURN 5% G	20 KG	141.25	190.69	269.50	345.30	293.51	15%	345.30	0%
SATURN D EC	1 LTR	78.75	106.31	146.36	192.40	163.54	15%	192.40	0%
DAZVIN 5G	16.7 KG	153.70	207.50	292.31	365.10	310.34	15%	365.10	0%
SEVIN 85S	500 G	44.0	59.40	99.67	138.85	118.02	15%	138.85	0%
AVERAGE		96.34	130.06	187.03	242.50	206.13	15%	242.50	0%

CROP	INSECT PEST	DISEASE	WEED
Rice	GIH, army worms, cutworms, stemborers, ricebug, caseworm, leaf folder	Tungro, leaf blight sheath blight, neck rot, rice blast	E. crus galis, C. Iria, M. C. Differmis, M. vaginalis, E. Aquatica
Corn	Corn borer, army worm, cut worms, whorl maggots	Stalk rot, downy mildew	Common upland weeds

The major bodies involved in control of insect pests are the National Crop Protection Center (NCPC), the Bureau of Plant Industry (BPI), the National Food and Agricultural Council (NFAC), and the Bureau of Agricultural Extension (BAEx), and their functions are outlined below. There is also the Bureau of Agricultural Economics which monitors agricultural production statistics and farm management as well as market prices of farm inputs including agricultural chemical prices.

1) The NCPC conducts problem analysis, research, information dissemination and training in pest management at the farm level. The implementation of the NCPC's findings is conducted by the Bureau of Plant Industry and Bureau of Agricultural Extension.

2) BPI is concerned with the development and improvement of crop protection techniques and technology. BPI has organized the Surveillance and Early Warning System (SEWS) which monitors pest incidence and endeavors to develop appropriate crop protection measures. It maintains 279 ecological units and 1,842 observation stations. In cooperation with the German Agency for Technical Cooperation, the Bureau has set up laboratories which analyze and monitor pesticide residues in agricultural products and assess their environmental impact. The laboratories also conduct routine checks on pesticide formulations in collaboration with FPA.

3) The NFAC was organized to supervise, coordinate and evaluate the implementation of the food self-sufficiency programs of the Government including Masagana 99, (an increased rice production program), Maisagana (a corn production program) and Gulayan sa Kalusugan (a farmers credit program to facilitate improved agricultural productivity). These food programs provide financial assistance and extension services to farmers. At each planting season, NFAC provides a list of recommended pesticides based on efficacy and users safety including the proper application rates and approved government prices.

4) BAEx activities concern implementation of the recommended pest management procedures at the farm level.

In recent years, the quantity of pesticides used has been decreasing for the following reasons:

a) While the price of agricultural chemicals has been spiraling (over 90% in 1983), the farm gate price of rice has not grown at a comparable rate.

b) According to Integrated Pest Control Program sources, farmers who have not been adequately instructed regarding the aims of the program believe that appropriate control can be effected even if they reduce the amount of insecticide, when in actual fact they are using insecticides in inadequate quantities.

According to various surveys, the present level of pest control among farmers involves only two or three insecticide sprayings where they should be spraying four to five times.