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Spring Review

New Cereal Varieties

RICE in the PHILIPPINES

March 1969

USAID - PHILIPPINES

draft

COUNTRY CROP PAPER
PHILIPPINES
RICE

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GLOSSARY OF TERMS

CROP YEAR - Approximately a Fiscal Year. July 1 through June 30.

PALAY - PADDY RICE - rough rice threshed but not milled.

Palay (Rough) Rice

1 cavan rough rice (palay) = 97 lbs. or 44 kilos
1 metric ton (2204.6 lbs) palay = 22.727 cavans (palay)
1 cavan rough rice (palay) = approximately 63 lbs cleaned rice (milling yields vary according to the efficiency of the mill)
1 metric ton palay yields approximately 1,433 lbs cleaned rice
34,965 cavans palay = 1 metric ton cleaned rice

Clean Rice

1 cavan = 57 kilos = 123,4576 lbs = 2.13 bushels
1 ganta = 2.3 kilos = 5,07058 lbs.
1 m.t. (clean rice) = 17,857 cavans clean rice at 56 kilos each
1 quintal (palay = 2.27 cavans palay)

WET SEASON - Season in which rains generally occur. In Central Luzon, usually May through October.

DRY SEASON - Opposite of wet season--usually November through April.

PRIORITY I PROVINCES - Originally there were 10 Provinces named as Priority I Provinces because of their potential in rice production. However, there have been five more added recently to make 15. They are:

1. Bataan
2. Bulacan
3. Cagayan
4. Camarines Sur
5. Cotabato
6. Iloilo
7. Isabels
8. Laguna
9. Leyte
10. Mindoro Oriental
11. Nueva Ecija
12. Nueva Vizcaya
13. Pampanga
14. Pangasinan
15. Tarlac

RAINED or NON-IRRIGATED- Rice cultivation where rain is the only source of water. Rain and some run-off is collected in paddies and, in some cases, transferred from paddy to paddy by gravity.

IRRIGATED - Rice cultivation whereby water is introduced by man-made devices from surface or underground water sources.

ABBREVIATIONS USED

ACA	- Agricultural Credit Administration
APC	- Agricultural Productivity Commission
BAE	- Bureau of Agricultural Economics
BAI	- Bureau of Animal Industry
BL	- Bureau of Lands
BPI	- Bureau of Plant Industry
BS	- Bureau of Soils
CB	- Central Bank of the Philippines
DANR	- Department of Agriculture and Natural Resources
DBP	- Development Bank of the Philippines
HYV	- High Yielding Varieties
NEC	- National Economic Council
NIA	- National Irrigation Administration
PES	- Presidential Economic Staff
PNB	- Philippine National Bank
RCA	- Rice and Corn Administration
RCPCC	- Rice and Corn Production Coordinating Council
UPCA	- University of the Philippines College of Agriculture
IRRI	- International Rice Research Institute
GOP	- Government of the Philippines
FACOMA	- Farmers' Cooperative Marketing Association
ADCR	- Agricultural Development Council of Rizal Province
SPCMA	- Sugar Producers' Cooperative and Marketing Association
AGLF	- Agricultural Guarantee and Loan Fund
GRAMACOP	- Grain Marketing Cooperative of the Philippines

PHILCUSA - Philippine Council for USAID-(now NEC)

HYV - High-Yielding Varieties

ESFAC - Esso Standard Fertilizer and Agricultural Chemical Co., Inc.

ADB - Asian Development Bank

MSA - Mutual Security Agency

INTRODUCTION

The story of the rapid adoption by the Filipino farmers of the new high-yielding rice varieties is epical in the history of agricultural development. In the short time span of two years, the Philippines progressed from a net importer of rice, costing the country anywhere from $20 million to $50 million in foreign exchange annually, to become a net exporter at $7 million in foreign exchange in 1968. This accomplishment has attracted the attention of scientists, development experts, and administrators in Government, international agencies, and institutions throughout the world.

The success is a tribute to the capabilities andpotential of small, subsistence rice farmers of that country. Skeptics were amazed, not so much that farmers had adopted the new varieties, but that they were able so quickly to assimilate and use the advanced technology of cultivation involved in fertilizer use and water and soil management required with the new varieties to obtain the high yield. Some people had felt that years, perhaps even generations, would be required to make such revolutionary changes in traditional rice farming practices.

Fundamentally responsible for making the change possible were the scientists whose knowledge, vision, and research efforts in plant breeding produced the varieties of rice that could increase yields with the application of advanced technology. This provided the incentive to farmers to seek

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and make risks involved in changing their practices. The scientists at the International Rice Research Institute in Los Banos were the first to come through. These were followed by development by the scientists of the Government's Bureau of Plant Industry. However, if other men who formed the link between the farmers and the scientists in the research station had not had the vision and the faith in the abilities of the small rice farmers of the Philippines, the story would most likely have ended at the research station. This has been the history of many such developments in the past in less developed countries.

On the Philippine side, the man who stands out for his faith in the small rice farmers and his leadership to assist them was President Ferdinand Marcos. Under him were a number of capable administrators, including the Executive Secretary to the President Ratael Salas.

On the U.S. side, USAID's Mission Director Wesley Haraldson had the vision and faith to commit full U.S. financial and technical support for the two Provinces' pilot projects of Laguana and Tarlac to prove the possibilities. Following the success of these projects, he backed the twelve Priority One Provinces program. Two of the Mission Director's technical officers who had primary responsibility for AID's participation in the rice program deserve credit for their role in assisting the National Government Agencies and Provincial Governments in their successful implementation of the two pilot projects and the program in the twelve Priority One Provinces. They were Wilmot Averill, former Chief of the Rural Development and Agriculture Office, and Harold Koone, formerly the Food and Agriculture Officer and most recently the new Chief of the ARD Office.

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The Philippines was selected by AID/Washington along with eleven other countries having similar records of adoption of new high-yield grain varieties for a World-Wide Spring Crop Review in 1974. The purpose of the Review was to learn lessons from these experiences in agricultural development and use of technical assistance for guidance of future programs. The plan for the "Review" calls for a "Country Crop" paper from each of the twelve countries selected. The paper would be prepared according to criteria specified by AID/Washington. The crop papers would be reviewed and analyzed for contributing factors by a panel of experts from Government and private institutions. The experts would draft world summaries on crops and selected contributing factors. These summaries would be reviewed by another panel of experts before being finally presented to top AID Administrators.

The "Philippine Rice Report" represents a cooperative effort between the East Asia Bureau of AID/Washington and the USAID Mission in the Philippines. Using the general criteria specified by AID/Washington for the country crop paper, a first, rough draft was prepared by the Agricultural and Rural Development Division of the East Asia Bureau's Technical Advisory Office from material available with it and the Philippine Desk. This draft was forwarded to the USAID/Philippine Mission for completion. At the Mission's request, William F. Johnson of the East Asia Technical Advisory Office, AID/Washington, went to the Philippines in

February 1969 and worked with Lewis E. Swanson and Harold Koone, Chief, and others of the Agricultural and Rural Development Office in completing the drafting. Final editing and art work for the Report was done by the Mission. The Report was reviewed and approved by the Review Committee and Mission Director and submitted to Washington on March 15, 1969. Since that date, some additions have been made to the Report to elaborate for specific questions raised by the Review.

Introductory comments by the Agricultural and Rural Development Division, East Asia Technical Advisory Office, AID/Washington.

USAID
PHILIPPINE MISSION
3-3-69

SECTION I

COUNTRY CROP PAPER
PHILIPPINES
RICE

I. Record to Date

A. Crop Production

1. Crop Production Before New Varieties

Rice is the principal staple food in the Philippines. In Urban areas, it accounts for 50% of the average 2000 calories in the daily per capita diet. For the rural areas, it accounts for 74% of the daily per capita diet. While this dietary level is below the 2300 calories, considered in FAO studies to be a minimum healthful level for Asians, maintaining this level with an expanding population through production and imports of rice, has been a primary objective of the country, especially during the past decade.[1/]

From the turn of the century, and until this past crop year (1968), when the newly introduced high-yielding varieties (HYV) were adopted on a wide scale throughout the Philippines, rice production had not been adequate to meet the domestic demands.[2a/]

1/ See Table I, Appendix; From Rice and People in 1990: Output and Input Requirements, Frank H. Golay and Marvin E. Goodstein, Table A4, p.46, and Table A6, p.48, USAID Mission to the Philippines, August 1967.

2a/ See Tables I and IA (RCA)

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Rice had to be imported almost every year since the early 1900s to meet the food deficit. Since 1900, there has been a tight race between population, expansion of cultivated area to meet food requirements, and food supply. As population grew, new frontiers were opened to provide more land for the cultivation of the principal staple food, rice. Until recent years, the rate of increase in population just about equaled the rate of expansion of land cultivated to provide subsistence for the rural population. The food deficit remained. Since 1920, there had been very little improvement in productivity per unit area of land. In the period 1910-14, the population was about 8,500,000. The area cultivated in rice was 1,140,194 hectares, with a national average yield of 757 kilograms per hectare.[2] By 1920, the population had reached 10,465,000, and land cultivated in rice had risen to 1,630,636 hectares. Yields had risen to 1,105 kilograms per hectare. This improvement in 1920 was caused by expansion of irrigation facilities. During this period 60,000 hectares of irrigated land was developed. This is the last significant change in yields that took place until 1966-67, and 1967-68 when the high-yielding varieties contributed to an appreciable increase in unit area yields.[3]

Rice production figures are available since 1946 when 2,[illegible],240 M.T. were produced. By 1952, production had risen to 3,967,000 M.T. and the area under cultivation had become stabilized at around 3,200,000 hectares. The 1966-67 production was only 69,000 M.T.

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[2] See Tables I and II, Appendix; Ibid., p. 43.
[3] Ibid., p. 77; For per capita area in Rice, see Table XII.

over the peak previous year of 1962. Thus, it appears that both production and acreage were fairly stabilized from 1962 until the effects of the high-yielding varieties began to show up in 1967.

Yields had remained constant at about 1100 to 1200 kilograms per hectare from 1920 to 1963.[2] These yields were among the lowest in Asia, and contrasted sharply with those in Japan of 5,000 kilograms per hectare, and in the Republic of China (Taiwan) of 4,000 kilograms per hectare.[4] Population had reached a level of 28,000,000 by 1960-62, and 32,355,000 by 1965. In the aggregate, both national average unit area yields and the per capita area cultivated in rice had remained fairly stable.[5] The Government had to increase imports of rice to meet food deficits. Imports had risen from an average of approximately 65,000 M.T. per year for the ten-year period 1950-61 to 1958-59 to an average of approximately 169,000 M.T. per year for the seven-year period 1959-60 to 1966-67. Imports for 1964-65 were 569,800 M.T.; for 1965-66, they were 108,009 M.T.; and for 1966-67, they were 220,529 M.T. There were no imports for the year 1968-69.[6]

Stabilization of area under cultivation from period 1962-63, reflected an end of expansion of the frontier. New and unused land suitable for rice cultivation was rapidly becoming non-existent. In fact, some of the land now producing rice strictly for local

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4/ See Table IV, Appendix; Production Year Book, 1966, Vol. 20, Food and Agriculture Organization of the United Nations.

5/ See Table II, Appendix; Op. cit., Gelay, p. 43; and Table III, Ibid, Table A4, p. 46.

6/ See Table I, Appendix, and Table IA, Appendix, RCA, GOP.

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consumption as food, would be better suited for alternate crops.

There have been fluctuation in productivity and production or rice in the Philippines from year to year due to environmental factors.[7/] For this discussion, these include climate, weather and the changes (either improvement or deterioration) of irrigation and flood control facilities.

Likewise, these environmental factors account for variations in production and yields among the regions within the Philippines.[8/] Typical of rice cultivation in much of Asia, each region of the Philippines has traditionally grown rice in a number of ways, depending on the climate, soils, topography, water situation and developement of irrigation. These factors which influence, or determine the method of cultivation also influence the yield. In order to describe these methods, definition of terms is necessary. The terms "upland", "rainfed", and "non-irrigated" are often used in the Philippines to signify the same type of rice cultivation. However, "upland" is also sometimes used to describe a type of dryland cultivation usually practiced with wheat or similar cereals.

7/ Environmental, Technological, and Institutional Factors in the Growth, of Rice Production: Philippines, Thailand, and Taiwan, by S.C.Hsieh and V.W. Ruttan, Food Research Institute Studies, Vol. VII, No. 3,1967,p.313

8/ See Table V, Appendix; Bureau of Census and Statistics, Agricultural Census, Summary, Op. cit. Golay, Table C1, p. 109.

There is very little of such rice cultivation in the Philippines, although it is practiced in some other countries of Southeast Asia. So, "upland rice" will not be used in this paper. Rice is grown in the Philippines predominantly as an aquatic crop on land using "rainfed" (sometimes referred to as non-irrigated) conditions, or using irrigation. The term "rainfed" is used where rain is the sole source of water. "Irrigated" is used where water is supplied through man-made facilties from surface or underground sources. "Irrigated land" may refer to rice land which is intended for irrigation, although water may not be diverted throughout the year, but is available for diversion at some time during the year -- usually the rainy season.

By far, the greatest percentage of the rainfed and all of the irrigated is cultivated in paddies. These are small, level areas surrounded by low bunds, or dykes in which the rice is kept inundated when sufficient water is available. In the case of rainfed paddies, however, inundation usually occurs only during periods of frequent rains.

Yields vary a great deal by the methods of cultivation used. Yields are lowest for rainfed farming of rice when drought conditions exist, being as low as 780 kilograms per hectare. Soil types and the fluctuation of rainfall account for much of this variation in production. In this system, water control and management are difficult, or impossible. Controlling weeds is also a problem. In

contrast, in irrigated cultivation of rice, usually in lowlands, water can be controlled and managed (excepting with floods), to suit the needs of the plant. Fertilization can be better managed and weeds are easier to control. Thus, yields are greater than in rainfed cultivation. Of course, soil types add their influences, and as more fertile soils are usually found in the lowlands, this factor improves yields. Under irrigated conditions, yields ranged roughly from about 1200 kilograms per hectare to 4000 kilograms per hectare before the introduction of the high-yielding varieties (in 1966). The average yield was 1325 kilograms per hectare in 1966.

The approximately 3 million hectares devoted to rice production in 1968 is 37.5% of the total 8,000,000 hectares of arable land in the country.[9/] Of the 3,000,000 hectares in rice, approximately 750,000 hectares, or 25% was irrigated artificially . About 250 ,000 hectares are irrigated sufficiently to permit two crops per year to be grown. The remaining 500,000 hectares though ,irrigated, do not presently have sufficient water for more than one crop per year. The remaining rice area of 2,000,000 is rainfed; only one crop per year is grown on this land. Irrigated crop areas are most prevalent in a few regions, such as Central Luzon, Bicol, and southern and western Mindanao.[10/] The area devoted to second cropping (irrigated during dry season) is relatively small in all

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9/ See Table I; see also Table I-B from Report from Bureau of Agricultural economics, Annual Report, January , 1968.

10/ See Table I-C, Gravity Irrigation in Central Luzon; National Irrigation Administration, Feb. 26, 1968; NSU of Jan.,1968

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regions, but is greatest in Central Luzon. There are a number of reasons for lack of improvement in rice production before introduction of high yielding varieties.

Lack of effective institutions to serve farmers (research, extension, marketing and credit), inadequate infrastructural development, (particularly in transport), and communications and irrigations have long been obstacles to agricultural development in the Philippines. Development was also restricted by a number of other factors: lack of capital markets for private investment in the development of land and irrigation; the traditional pattern of land ownership and tenancy; low farm prices for rice, relative to prices of fertilizer and other inputs; non-availability of the necessary inputs: and level of economic development of the country before the advent of the high-yielding varieties. There were other reasons that agricultural productivity had not been increased in the Philippines, as was pointed out by the Asian Development Bank(ADB) in its survey of Asian agriculture. The main reason was that science had not given the farmers of Asia the benefit of develpments in plant biology, other improved technology, and developed institutions that farmers in developed countries had received.[11/] Farmers in the Philippines practiced traditional methods of cultivation used by their forefathers for centuries past, which had remained practically unchanged, except for some improvement in irrigation in some areas, until the new varieties were introduced. The varieties of rice seed had been principally of

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11/ A Report of Survey of Asian Agriculture, by the Asian Development Bank, March 1968.

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the Indica type, which is common for most of tropical Asia. It is characterized by tall stature, heavy and early vegetative growth, weak straw and low yield. Its response in yield of grain to the application of nitrogen fertilizer is low (about 20 to 40%). Fertilizer also increases the height of the plant, which increase its tendency to lodge, causing loss of grain. The risks of a crop loss and the low returns were not adequate incentive for traditional farmers growing this rice to invest in fertilizer, even if other factors had been adequate, which they were not.

The Philippines was faced with the problem of either diverting other crop area to rice, increasing imports of rice, or increasing yields per unit area. Limited foreign exchange and a deficit production of food crops other than rice provided no other choice than to improve yields. With the limited arable land area suitable for rice production, it was imperative that productivity be increased. Fortunately for the country, new varieties capable of increasing yields by 50 to 100 percent were under development and were released in 1965.

2. The Breakthrough - The New Rice Varieties

With the new high-yielding varieties of rice, it is well established that science has finally given the farmers of the less-developed countries of Asia an incentive to increase production. These varieties were developed at the International Rice Research Institute (IRRI) at Los Banos in the Philippines, and at the Philippine Government research stations. They are highly responsive in their ability to utilize high quantities of nitrogen to increase grain production. Yields obtained under trial conditions have been phenomenal: as much as 10,000 kilograms per hectare have been obtained for one crop, which is 3 to 4 times those achieved with traditional varieties. An outstanding characteristic of the IRRI varieties, as well as the varieties developed by the GOP institutions, is the shortness of the straw and the ability of the plant to increase its yields of grain by the use of fertilizer without unduly increasing the height of the plant. The typical Indica species, which were the traditional types grown in the Philippines and most of Asia, tend to increase in height with the application of nitrogen fertilizer, without any increase in grain after certain minimum levels of nitrogen have been applied. This is especially true of performance during the wet season, when additional height of stalk increases the possibilities of lodging. The short straw characteristic of the IRRI varieties had, in fact, been the genetic goal of IRRI scientists in cross-breeding the dwarf

Japonica with the long-stemmed, Indica rice types. The Japonica types had been selected originally in Japan and used in Taiwan in breeding suitable varieties for their climates. The short stem reduces susceptibility to lodging, and consequently decreases damage caused by wind and heavy rain; a serious threat in this region.

Other important advantages of the new varieties are their short growing period, 100-130 days versus 140 to 180 days for the common varieties, and low photo-sensitivity. These are important features in the tropics, where the length of days are short, skies are overcast with clouds during the rainy season, and temperatures are fairly constant the year round. Provided adequate water is available, the new varieties can be cultivated throughout the year, producing 2-1/2 to 3 crops because of their low photo-sensitivity and short maturing period. Previous to the development of the so-called "miracle" varieties of rice, none of the high-yielding varieties of temperate latitudes, including those of Japan, would produce economically in the tropical latitudes.

The high yielding varieties do require water, as well as fertilizer and insecticides to achieve maximum yields. They respond best where water management is well controlled. However, it has been confirmed that they also outyield indigenous varieties under rainfed conditions, but not to the same degree as under irrigated conditions for the reasons indicated in Section I.

Until 1966, there had been some doubt that the results obtained under experimental conditions at IRRI and at GOP institutions could be successfully transferred to the underdeveloped farms of the Philippines, where

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cultural practices are performed by hand or with carabao. Then with USAID assistance, programs got underway to conduct adaptive trials of the new varieties on typical farms in two pilot areas where AID was working with the provincial government and central agencies on the "SPREAD" program of rural development. The results obtained in those two pilot programs at Bay, Laguna and at Mayantoc, Tarlac, exceeded expectations, causing enthusiasm and eagerness to extend the program rapidly. The results provided information and data which were used by the Government in a program to extend the varieties to other provinces.

The Government in 1967 designated 12 principal rice provinces from the three islands (Luzon, Visayas and Mindanao) as Priority I provinces for the concentration of its efforts in the spread of the new HYV. These twelve provinces were selected on the basis of suitable land and available water for growing the high-yielding varieties. Twenty-two other provinces were grouped together to form a Priority II area. These provinces, although rice producers, did not have extensive irrigated lands as did those composing priority area I.

The 1967 crop season offered a real opportunity to assess the results of the production of IR-8 and other new varieties on farms of many types and sizes over a wide geographic area. The first large scale plantings of IR-8 were undertaken during the wet season of 1967. That was the first season in which seed was not a limiting factor. IRRI reported that unofficial estimates indicated 200,000 hectares were planted to improved varieties in 1967.[12/]

12/ Agricultural Economics, Annual Report for 1967, The International Rice Research Institute (by Dr. Randolph Barker), Los Banos, 1967, p.2.

Surveys of 35 irrigated farms in Pampanga and Bataan provinces were conducted by IRRI on the yields of the 1967 dry season plantings of improved varieties. These farms consisted of 20 owner-operated farms and 35 tenant farms. Of the total, 16 owner-operators and 28 tenants used IR-8. The rest of the group used NPI-76-1 (an improved variety developed by the Bureau of Plant Industry). Yields were compared with the yields of these farms during the 1966 wet season when local varieties had been grown. Previous surveys of the same farms had shown no differences between wet and dry season yields. In comparing yields of the old and improved varieties, the IRRI surveys showed significant differences in performances. The improved varieties produced higher yields, they required higher input costs, and they produced higher net returns than did the old standard varieties. This was found to be the case both for owner-operated and tenant farms.

IR-8 yielded 4,523 kilograms per hectare on owner-operated farms and 4,268 kilograms per hectare on the tenant farms. Local, traditional varieties had yielded 2,948 kilograms per hectare on the owner-operated farms and 2,200 kilograms per hectare on the tenant farms. The survey showed a superior performance of the NPV on all farms. A significant finding was the adoption by share tenants of the new varieties and the technology of farming. This achievement had important implications for the success of the varieties throughout the Philippines, as well as offering hopes for its agricultural development.[13/]

In a seperate survey, the Agricultural Development Council of Rizal (ADCR), which was founded in 1966, to promote agricultural development

13/ See Table VI, Appendix; Ibid., Table 1, p. 4.

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in the Province, recorded the results of the first plantings on 45 farms (37 irrigated and 8 rainfed, or non-irrigated), which had been under the ADCR program. IR-8 yielded an average of 5,232 kilograms per hectare on the irrigated farms and 4,721 kilograms per hectare on the non-irrigated farms.[14/]

In 1967, more complete information was obtained by the ADCR for the dry season as the result of a 10% sample survey conducted in the rice producing farms of Rizal Province. These results are shown in the first four columns of Table VII for IR-8 and for Binato (or Thailand) rice variation, the latter being a popular local variety. The average yield of IR-8 in 200 samples was 5.66 MT per hectare. The average yield of Binato in 127 samples was 3.17 MT per hectare.

A similar survey was conducted in three municipalities of Laguna by Mr. S. H. Liao during the fall of 1967. His survey covered 155 predominantly tenant operated farms, which had been surveyed earlier when local varieties were grown. As with the two previous surveys, the yields achieved and the input levels were higher with the new variety (IR-8) than with the old ones. IR-8 yielded from 4224 to 4752 kilograms per hectare, while local varieties yielded from 2112 to 2420 kilograms per hectare. The yields reported in this survey reflect typhoon damage which affected yields of both the new and old types.[15/]

The following table illustrates the rapid growth in the use of the high-yielding rice varieties throughout the Philippines since 1966.

14/ See last two columns under 1966 "wet" of Table VII, Appendix; Ibid., Table II, p.8, which is information obtained from records of the Agricultural Development Council of Rizal.

15/ Table VIII, Appendix; Ibid., Table 3, p. 71.

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TABLE VIII-A[16/]

Area Planted in HYV as Compared to
Total Area in Rice
(Hectares)

Crop Year	Area in HYV	Total Area Reported	% of High Yielding Varieties
1966-1967	82,596	2,915,000	3.0
1967-1968	352,463	2,787,502	13.0
1968-1969 First Crop 7*	339,411	1,936,287**	18.0

*Figures for 1968-1969 are preliminary. A further breakdown of production by seasons is shown in Table VIII-B, Appendix.

**A large percentage of non-irrigated plantings not reported to date.

During the crop year 1967-1968 (from July 1967 to June 1968) expansion of the use of the high-yielding varieties of rice reached 352,463 hectares. This expansion contributed to the increased production which reached 119,306,007 cavans (5,269,330 M.T.). This was an increase of 20 percent over the crop year 1966-1967. National average yields had reached 42.8 cavans per hectare (1883 kilograms per hectare). This represents an increase of 42 percent over the 1968 figure of 1966-67 before the adoption of IR-8.[17/]

While statistics on production, yields, area planted to rice, and amounts of rice in storage and marketed differed between the various agencies (NCPCC, BAE, NEC and RCA), there was ample evidence of self-sufficiency in the country by the end of 1967. President Ferdinand E.

16/ NCPCC Annual Report for FY 1967-1968; HYV = high yielding varieties

17/ See Table VIII-B, Appendix; NCPCC Annual Report, 1967-68. See also Table VIII-C, and Table VIII-F

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Marcos announced in his State of the Nation Address on January 22, 1968, that the country had obtained self-sufficiency in rice.[18] Storage space became acute, and the country had to re-export a considerable amount of the rice imported in 1967.

Continued expansion of acreage devoted to the HYV in 1968 and the increase in production satisfied domestic demand and put the country in an export position for the first time. However, this brought new problems. Storage continued to be a problem; farm and retail prices of rice declined private wholesalers stopped buying from farmers in some areas; and the Rice and Corn Administration depleted its price-support funds early in the harvest season. Unable to sell its stocks because of the low retail price and unable to obtain adequate additional funds, it was out of the rice business for most of 1968.

The new high-yielding varieties have been proven through three years of national testing during the crop years 1966-67, 1967-68, and 1968-69. A great deal more is known about their performances. Increased yields have been well established. Questions of taste acceptance, milling qualities, and susceptibility of the IR-8 to certain diseases had arisen. However, IR-8 had pioneered the introduction of the new variaties. Other new varieties had been developed at IRRI, BPI, and the University of the Philippines College of Agriculture and introduced to farmers. These had features aimed at overcoming objectionable features of IR-8 such as

18/ The Journal of the American Chamber of Commerce of the Philippines, January 1969, p.6.

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its taste quality, tendency to break when milled and susceptibility to bacterial leaf blight. IR-5 was one of these. It was more resistant to some diseases than IR-8, and yielded more during the dry season, but did not perform as well during the wet season. During the wet season IR-5 grew somewhat taller than IR-8, which caused some lodging especially with heavy fertilization. Some other varieties were proving promising. C4-63 was one of these.[19] Production of rice had registered increases in all regions with the new varieties outyielding old varieties in every case.[20] Tenants and owner-operators were adopting the new varieties with equal enthusiasm. Furthermore, the varieties had spread to uplands where rainfed, or non-irrigated farming was practiceddd. This had not been programmed by the Government.

The shortness of the maturity period of the new varieties and the consequent less amount of water required were features which had saved the Philippines from possible catastrophic rice shortages which could have occurred during the two crop years 1967-68 and 1968-69.[21] The maturity periods enabled the new varieties to partially escape the typhoon of November 1967 which caused more extensive damage to the traditional varieties. While this can be claimed to have been a mere chance, the traditional varieties did not escape the typhoon, but suffered heavy losses in the adjacent areas where the HYV had just been harvested. Even where the IR-8 and other HYVs had not been harvested, damage

19/ See Table VIII-B, Appendix, RCFCC Field Offices Report, Dec. 1968.
20/ See Table B
21/ See Table VIII-C

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was less than to common varieties. The longer maturity period of the traditional variety increases its chances of being hit by a typhoon. Again in 1968-1969, the high-yielding varieties largely escaped drought damage brought on by the early cut-off of the rainy season. The common varieties did not fare so well due to their growth period requirements. Production from the new varieties off-set the losses suffered by the traditional variety crop of 1967-1968. This appears to have been the case for the 1968-69 crop also.

The HYVs had expanded during the wet season of 1968-1969 to an estimated 339,411. No data are available for 1968-69 but estimates are that the crop will be equal to or greater than that of 1967-68. 22/

Evidence of the increased domestic supply of rice during the past two years in the Philippines is found in the program of import-exports. No rice was imported during 1968. Rather, the country was able to export rice from its domestic supply for the first time. A small amount of seed rice had been exported in 1967. In 1968, a total of 42,880 M. T. of milled rice was exported. 22a/

22/ ~~See Table~~ VIII-E.

22a/ See Table I-D.

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B. Input Utilization

1. New HYD Seed Varieties

The development of the IR-8 rice variety at IRRI provided the breakthrough on high-yielding varieties. Genetic work on cross-breeding to obtain this short-stemmed, high-yielding, low photo-sensitive variety had started when IRRI began operations in 1962. This was one year after it was founded by Ford and Rockefeller Foundations by agreement with the Philippine Government. Its staff of plant geneticists had been brought to IRRI from rice research institutions throughout the world. They were backed by the experience of the Rockefeller station in Mexico where already the break-through on wheat with similar characteristics had been achieved several years before, after 20 years of research work.

It is interesting to note that credit for the development of the short-stemmed, high-yielding varieties of both wheat and rice must go to Japan where the original mutations were selected. Japan has long had the short-stemmed rice, which was the antecedent of genetic developments and adoption in Taiwan, and later at IRRI. Japan's dwarf wheat variety had been discovered by a U.S. scientist in 1947, who brought back 10 grams of wheat germ plasm to the U.S. Agricultural Research Station at Beltsville. This led to the development of the spectacular short-stemmed varieties in the U.S. which revolutionized wheat production in this country during the 1950's. Descendants of the original Japanese wheat germ were used in the research by Rockefeller as research material for reaching its

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objective in Mexico. Again the germ plasm resulted in similar dwarf varieties of wheat with low photo sensitivity, or ones which were insensitive to day length. The characteristic permitted the cultivation of the wheat in wide latitudes with varying lengths of day, and has permitted its spread around the world to Turkey, India and Pakistan. The new high-yielding varieties of rice have similar characteristics which is permitting spread of its use to these same latitudes throughout the world.

The IRRI scientists using the experience gained in the breeding of short-stemmed wheats, knew what their objective was and how it might be achieved. Development of IR-8 took them about four (4) years (1962-1965 inclusive), after which the variety was ready for field trials, although it had not yet been thoroughly tested for resistance to insects or diseases, nor other adaptive factors in the Philippines. Four years was startingly short for such a breeding achievement. However, one should not overlook the long history of research in Mexico, the U.S., and in Japan that had laid the ground work. It is said that Japan spent 25 years before 1947 in developing dwarf varieties of wheat and rice.

IRRI has been criticized for the premature release of IR-8 because of its high susceptibility to bacterial leaf blight, and because of its so called poor eating and milling qualities. However, IRRI was under pressure by the Philippine Government to get the rice in production. Considering its impact and the influence and stimulus that

D-2-8

the variety has given to rice research in the Philippines and around the world, the merits of the release far outweigh the effects of such criticism. In any case, IRRI is continuing to develop varieties that have improved qualities over IR-8: more resistant to blight (IR-5), and other diseases; better milling qualities (less susceptible to breakage); and shorter maturation (a 90-day variety, IR-400, known as short pete, can be used to grow a third crop). It is IRRI's aim to develop varieties that will be more resistant to the major insects and diseases of the tropics; thus reducing requirement for their more costly control by chemicals. This is an ambitious program. Much must still be learned about tropical rice diseases. In one of IRRI's first field tests, 200 hectares of a high-yielding varieties was wiped out by a fungus that IRRI scientists could not identify. A plant pathologist was called in from Japan. He found that no one fungus had killed the crop, but a complex of several, some of which had not been identified previously. Consequently, selections of the IR series were and are continuing to be developed to resist many of these diseases.

The Bureau of Plant Industry of the Philippine Government also developed similar high-yielding varieties. BPI-76-1 was one of them. The College of Agriculture of the University of the Philippines developed C-4. However, IR-8 was the highest yielder of all, yielding, as already noted, as much as 10,000 kilograms per hectare in yield trials, and around 4,000 kilograms by farmers. IRRI rates it at 6 to 9 M.T. per hectare in the dry season, and 5 to 8 M.T. in the wet

D-29

season.[23] These varieties were the forerunner of a number of other seeds now being developed at the three institutions. IR-5 has reportedly out-yielded IR-8 during the dry season in areas where water is a limiting factor, or soil fertility is low. It is also reported to be more resistant to bacterial leaf blight.

Adoption of IR-8 was very rapid. It was released to a minute number of growers in 1965 for test and trial. Multiplication of the seed really got under way in 1966 with concentrations in the pilot provinces of Laguna (Municipality of Bay) and Tarlac (Municipality of Mayantoc). In March 1966, 1,069 kilograms of paddy were harvested from a 1,280 square meter test area in Bay, Laguna, amounting to a computed per hectare yield of 190 cavans (8,360 kilograms).. In May, 1966, a seed-multiplication plot in Barrio San Isidro, Laguna, was harvested and showed an estimated production of 200 cavans per hectare (8,800 kilograms). The average yield per hectare in the Bay area for the previous dry season had been 66 cavans (2,904 kilograms). The seed produced was spread rapidly through these two provinces. In September, 1967, the Province of Laguna had 10,000 hectares and the Province of Tarlac had 14,000 hectares planted to high-yielding varieties.[24]

It will be noted from Table IX, Appendix, that the average yields per hectare declined as the use of the high-yielding varieties became

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23/ O.P. cit., IRRI, 1967

24/ See Table IX, Appendix. Offices of RCPCC, Provincial Directors, Tarlac and Laguna.

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increasingly generalized, but they continued to be considerably above the Philippine average. The impact of the new seeds, along with prices and other facets of the pilot province program, is reflected in an increase in rice production in Tarlac from 3,417,400 cavans in 1966 to an estimated 5,700,000 cavans in 1968. The average yields per hectare rose from 37 to 57 cavans (1,628 kilograms to 2,508 kilograms respectively) during the two years.

IR-8 and other high-yielding varieties have spread throughout the Philippines from the two pilot provinces. The supply of seeds became a problem when the GOP began to push a national program. Acceptance by farmers of IR-8 was so rapid that seed supply remained a limiting factor to the spread of the new crop throughout 1967 until 1968 when supply seems to have overtaken demand. The concentrated program of seed multiplication and production was a key factor in the success of the rice self-sufficiency program.

There follows a brief description of the four major HYVs now being grown in the Philippines.

1. IR-8-288-3 -- (Peta x Dee-geo-woo-gen)

   1) strong seedling vigor

   2) short straw -- non-lodging -- (90-105 cm.)

   3) responsive to high levels of nitrogen

   4) moderately early maturing (about 120 days)

   5) insensitive to photoperiod

   6) moderate seed dormancy

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7) moderate resistant to tungro virus

Disadvantages:

1) susceptible to bacterial leaf blight

2) highly susceptible to many strains of rice blast fungus

3) grain is chalky and of medium size

4) milling recovery is relatively low

2. IR-5

1) moderately seasonal

2) medium resistance to lodging

3) highly responsive to nitrogen fertilization

4) matures in 125-145 days

5) high tillering capacity

6) highly vigorous

7) moderately resistant to bacterial leaf blight and virus diseases

8) medium milling qualities

9) medium eating qualities.

3. BPI-76-1 (Fortuna x Seratup Bonar 15)

1) non-seasonal and has a dormancy period from 4-6 weeks

2) medium resistance to lodging -- medium height (125 cm)

3) responsive to high nitrogen fertilization

4) matures in 120 days

5) medium tillering

6) moderately resistant to rice blast, stem borers, and yellow dwarf virus but may be seriously affected by bacterial leaf blight.

D-32

7) high milling recovery

8) good eating quality

4. C4-63 -- (Peta x BPI-76)

1) medium-short plant stature

2) moderately high tillering

3) matures about 4-4½ months (145 days)

4) resistant to lodging

5) moderately resistant to stem borers, blast and bacterial leaf blight

6) high yield potential

7) fairly high milling recovery

8) good eating quality

A study was made in 1965 by the University of the Philippines, College of Agriculture, under the supervision of Dr. F. A. Tiongson of the seed multiplication and distribution system of the Philippines. Information from the study is summarized in the following text.25/

The Bureau of Plant Industry (BPI) began a seed improvement program in 1952 in which the U.S. assisted through its Mutual Security Agency (MSA) and the Philippine Council for U.S. AID (PHILCUSA). The aim of the program was to provide farmers with improved seeds of better yielding varieties of various crops suitable for planting in specific regions of the country. In 1953, the program included seed improvement, seed multiplication, seed certification and distribution.

25/ Op. cit., IRRI, 1967.

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The Bureau of Plant Industry began producing certified seeds in 1957. In 1964, it initiated a program of testing seeds. The AID assisted program included the establishment of laboratories for seed testing and certification. The government program of seed multiplication and distribution has had three objectives:

(1) Approval and recommendation of varieties which are pure breeding and have uniform yield performance standards.

(2) Multiplication and distribution of "good" seeds from the list of seedboard approved varieties.

(3) Rapid multiplication and distribution of new and promising varieties.

The Bureau started handling distribution of seed in volumes in 1960. During that year, it distributed 4.3 thousand cavans of seeds, and supplied 0.14 percent of the total seed requirements of the country.[26]

The services of selected farmer-cooperators were solicited by the Bureau of Plant Industry for the multiplication of certified seeds in order to increase production. This enabled the system of seed multiplication to be carried on extensively. Only varieties approved by the seedboard are eligible for seed certification.

The purpose of seed certification is to maintain and make available to the public, stocks of high quality seeds. The program is

[26] See Table X, Appendix, Ibid., Table 14, p. 51.

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divided into two phases; field certification and laboratory certification. Field certification is the inspection of a field by a seed inspector who determines if the seeds are free from off-types or volunteer plants, weed seeds, and other contamination. Laboratory certification is the testing of the seed samples to determine whether they fall within the specific standards required for purity, germination moisture content, mixture with other varieties, red rice, weed seeds, and other contamination. samples that do not meet the requirements of either phase of the certification are rejected and, therfore, are not approved under the program.

The study made in 1965 showed that the number of farmers using certified seeds in the Philippines had increased between 1961 and 1965. There had been a corresponding increase in the volume of certified seeds sold by the Bureau as shown in Table X. But this was still very small considering that the palay seed requirements of the country is about 3.2 million cavans. The reasons for the small increase had to be determined to meet demands for the new program of spreading the new high yielding variety of rice.

The Government decided in 1966 that a program to speed up multiplication and distribution of the new high-yielding variety, IR-8, had to be inaugurated in order to spread adoption by farmers. Availability of seed to farmers and at the time needed was a crucial element for success of the program. The Rice and Corn Production Coordinating Council (RCPCC) took a calculated risk in establishing a program to temporarily circumvent many of the requirements of the Bureau of Plant Industry's certification system in favor of a system which would accelerate multiplication and distribution of IR-8.

In July 1966, 50 tons of IR-8 seeds from IRRI were turned over to the Rice and Corn Production Coordinating Council for distribution to selected multipliers in areas designated for IR-8 multiplication. The rice was sold by the Institute to ACA at ₱25.00 per cavan. Eighty percent of the seed was sold to 93 farmer-cooperators under the program and 20 percent was channeled to the test plots of the Agricultural Productivity Commission (extension service) and the Bureau of Plant Industry. The 93 farmer-cooperators were located in 6 provinces as follows: Nueva Ecija - 37, Tarlac - 24, Laguna - 10, Pangasinan - 9, Bataan - 7, and Bulacan 6.[27]

A random sample of 48 of these cooperators was selected and interviewed in a survey conducted in 1967. Of the group, 26 were owners, 10 were part owners, 10 were farm managers, and 2 were tenants.[28]

Table XI[29] shows the quantity of IR-8 produced on the 48 farms and sold as seed and as commercial rice during 1966 and the dry season following in 1967.[29] Approximately 50% was sold as seed during the wet season, and about 20% was sold as seed during the dry season. This suggests that there was considerable competition from other sources. This was from farmers not in the seed program who were breeding their own seeds. Therefore, the market had become well supplied by the end of the dry season in 1967, which was one year from the release of the seed from IRRI.

27/ Ibid., p. 52
28/ Ibid., p. 53
29/ Ibid., p. 54, Table 15

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Seeds from the 1966-67 crop were sold by cooperators to a wide range of government agencies and to private individuals as well. The largest government purchaser was the Agricultural Credit Administration which procured 54 percent of the IR-8 seed sold by the farmers surveyed. Private sources accounted for 26 percent of IR-8 seed sales. The average sale price was ₱29.34 per cavan or 44 kilograms.[30/]

The crash program of seed multiplication and distribution had achieved its goals of spreading the new high-yielding varieties throughout the country and satisfying demand. However, the effects of relaxing inspection requirements, and the detriment of the spread of seeds by farmers outside the controlled program began to show up in the 1968-69 crop. Evidence of mixed and contaminated varieties has been observed. While this has not reached a proportion of great significance, it is enough to cause the government to tighten its controls, which is being attempted through the BPI. Additional laboratories are being established, and a program to improve relations and incentives with cooperators has been undertaken.[31/]

An important step in the program has been taken by the private seed producers themselves in the establishment of an association of seed producers. The association in agreement with BPI has established association standards based on those of BPI, and is using its own inspectors to work with those of BPI to perform a useful and more efficient service for its member farmers.

30/ Ibid., p. 53

31/ Farmers will continue to grow their own seeds, but will have to purchase new stocks from time to time in order to get full benefits of a pure variety.

There is still need for improvement of BPI services, not only for rice seeds, but for seeds of all improved crops. This is an area where USAID assistance is continuing. 32/

32/ Described elsewhere, the U. S. has been assisting in institutional development (B.P.I.) since the early 1950's.

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SECTION 4

2. Land and Water

It is generally accepted that there were approximately 3 million hectares of land in rice cultivation in the Philippines in 1968. The RCPCC records indicate that 339,411 hectares were planted to high yielding varieties as of December 1968.[33/]

For the Philippines to meet its constantly increasing food needs, expansion of irrigation facilities, and more efficient utilization of systems presently installed, is essential. Since the amount of new land which can be brought under cultivation is negligible major production increases will have to come from double cropping of dry season cropping as well as increased productivity per crop. Moreover, the full potential of the HYVs can only be realized with careful water management.[33a/]

The Rice Self-Sufficiency Program lays special stress on the improvement and expansion of irrigation facilities to bring about production increases in the wet season, when rice is traditionally grown, and to make dry season culture possible. There are two GOP agencies in the irrigation field: the National Irrigation Administration (NIA), which has total responsibility for all national gravity systems plus supervision over communal irrigation projects, and the Irrigation Service Unit (ISU), which is concerned with pump irrigation, either from streams or wells.

33/ See Tables VIII-D

33a/ IRRI Annual Report 1967. This has been confirmed by BPI tests.

Figures derived in USAID[33b/] indicate that as of December 1968, there were 734,110 hectares of rice land under irrigation. The total designed irrigable area is 1,011,334 hectares, therefore about 72 per cent of the designed area is presently under irrigation. The RCPCC Annual Report for FY 1967-68 states that there were 150,943 hectares of new irrigated land added between July 1966 and June 30, 1968.[34/]

The RCPCC has set a somewhat ambitious goal of 477,000 hectares of rice land to be brought under irrigation by 1970. If the present rate of installation continues, there should be about 945,000 hectares at that time, which would be about 100,000 hectares short of the programmed goal.

The U. S. has provided both technical and capital assistance to the Philippines in the development and expansion of irrigation systems. Two local currency and two dollar loans have been made to the National Irrigation Administration (NIA). They were:

a) A 5 million Peso loan was made in July 1965 to accomplish emergency repairs to 65 systems and to assist in completion of 5 systems. Of this five million, 4,984,000 had been disbursed by the spring of 1968. Work had been finished except for the completion of three systems which were delayed by right-of-way acquisition problems, adverse weather and equipment problems.

b) A 6.6 million Peso loan was extended in January 1967 for rehabilitation and expansion of the Angat River Irrigation System. This system provides irrigation for a total of 31,000 hectares.

33b/ Refers to Report submitted to AID/W.

34/ NIA Annual Report FY 67-68, and ISU Advanced Annual Report FY 67-68.

c) A 4.7 million U. S. dollar loan to the NIA was approved by AID/W in June 1967. This loan provided for the procurement of equipment needed in the rehabilitation of 79 irrigation systems now under NIA jurisdiction which are designed to serve 282,000 hectares. It also provided funds for the support of NIA's program to overhaul its irrigation operation and maintenance arm.

d) The Asian Development Bank ahs recently granted 105,000 U. S. Dollars to the Philippines to assist the NIA in various technical aspects of water management and water use improvement.

Using the figures quoted above of:

3,000,000 hectares of potential rice land of which;

1,011,334 hectares are designed to be irrigated and,

1,988,666 hectates are not planned for irrigation;

and , assuming that each hectare of irrigated land would (conservatively) produce 1-1/3 crops per year, and the unirrigated land would produce only one crop per year, and that each hectare would yield 80 cavans of 44 kg., the production would be:

226,699,200 cavans or 11,734,765 M. T. of paddy rice per year.

A study by Dr. Frank H. Golay, Professor, Cornell University, and Dr. Marvin E. Goodstein, University of South, Sewanee, Ternessee in 1967 predicted that rice consumption in the Philippines in 1990 would be: 9.7

D-1

million MT (low estimate) or 13.7 million MT (high estimate).[35/] Therefore, it is estimated that resource potential exists to make the Philippines self-sufficient in rice for this period at current and improved per capita consumption level and current annual rate of population growth, This will require expansion of irrigated lands as planned, with increased utilization of irrigated lands until two crops per year is approached, and shift to improved HYVs continued until practically all rice planted are converted to the use of those types.

In 1967 USAID entered into a contract with Weitz-Hettelsater Engineers of Kansas City, Missouri to study, in depth, the storage, handling and marketing of selected crops in the Philippines, one of which was rice. They were assited by Sycip, Gorres, Velayo and Co., an industrial consulting and accounting firm with home offices in Manila. The W/H report which was submitted in mid-1968 projects production and consumption figures for paddy rice (palay) through 1980. They projected by logarithmic methods an annual production of 8.1 million of about 9 million MTA and a low estimate of 7.3 million MT. Extending their medium projection through 1990, the production would be about 8.8 million MT, which is not too far from the simple arithmetic projection of 11.7 million MT presented on the preceding page.[36/]

The W/H report also projects consumptiom, estimated at 7 million MT in 1980[36a/] which, extended to 1990, would be about 8.8 million MT. The projections

35/ Op. cit., Golay. The low estimate was based on a continuation of current per capita annual consumption of rice with a decrease in birth rates and moderate decrease in mortality rates. The high consumption was based on continuation of present birth rates, some decrease in mortality rates, and an increase in per capita annual consumption of rice to 120 kg. from the current estimatedlevel of 82 kg.

36/ Report by Weitz-Hettelsater Engineers, Prepared for U.S.A.D. under contract, dated June 1968 : SEE PAGE 153.

36a/ Ibid., p. 161.

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presented in the W/H report are that the Philippines will be self-sufficient in rice up to 1990 at current rate of population increase. In fact, W/H report predicts a surplus by slightly over 1 million MT by 1980.

SECTION 5

E. UTILIZATION OF INPUTS

3. Agricultural Chemicals

Before the introduction of the high-yielding varieties of rice in the Philippines, consumption of fertilizer in rice production was very low, although statistics are lacking on exact quantities for this purpose. Few rice farmers used fertilizer at all. Most of the consumption of fertilizer in the country was for sugar cane production. Even with this consumption, the national average per hectare was only 9.4 kilograms in 1964.[37/]

In order to make basic decisions for entering the fertilizer market in the Philippines, the ESSO Standard Fertilizer and Agricultural Chemical Company, Inc. (ESFAC) conducted two market studies. The first study in 1962 was to determine the size and potential of the market. The second study in 1964 was to determine a market development program.[38/]

The survey in 1964 covered 4,000 farms throughout the Philippines. In this study, the characteristics of fertilizer users versus non-users were studied; also factors restricting wide fertilizer use and the extent of use by region and crop were studied. The study revealed: (1) lack of adequate fertilizer supplies; (2) usage of fertilizer had been increasing at a rate of 9% per year; (3) only 30% of the Filipino farmers used fertilizer; (4) the average rate of fertilizer, where used, was below recommended levels;

37/ See Table XII, Appendix.

38/ An unpublished paper prepared by A.R. Burgett, USAID/Philippines, from information obtained at the Fertilizer Institute of the Philippines, dated 2/4/69.

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(5) lack of credit and high cost of fertilizer were not listed as major problems; (6) an educational program is vital to the development of a fertilizer market.

The survey showed that the 70% of farmers did not use fertilizer and that 78% of the area in cultivation was not fertilized. The majority of these farmers stated that they lacked knowledge of its proper use.

Lack of credit and high cost of fertilizer were not considered in this survey as major problems at that time (1964), since supplies were limited primarily to those furnished by the Government and these were sold to rice and corn farmers at 50% of their normal cost. Intended as an incentive to farmers, the actual result was resale by the farmers of the subsidized fertilizer on the black market at higher prices. While credit may not have been a factor when fertilizer was not available to most farmers, it was recognized that lack of credit could become a problem when fertilizer becomes available to greater number of farmers.

In 1964 fertilizer consumption was 294,000 M. T. The survey showed that if farmers using fertilizer applied the correct rates, fertilizer consumption in the country would be doubled.

The potential for increased fertilizer consumption in the Philippines for rice may have been appraised in 1964 by contrasting the consumption with that of other countries in Asia where agriculture was more advanced; Japan with 304 kilograms per hectare;the Republic of China (Taiwan) with 167.5 kilograms; and Korea with 167.5 kilograms per hectare.[39/] However, there was one striking advantage in incentives that the farmers in Japan

39/ See Table XII, Appendix.

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and the other countries had over the farmers in the Philippines in 1964 concerning fertilizer. They had a variety of rice that would respond to the application of nitrogen in increased yields of grain without the problem of increased stalk height and consequent lodging problems. While there were other reasons, the above was paramount.

Response to nitrogen fertilizer application, the critical factor in the farmer's decision to use or not to use it, was low for the traditional variety in the Philippines, Peta, a progeny of the Indica type used throughout Asia. The response curve (see Figure 1) from tests conducted at IRRI in 1964 shows that during the wet season, the variety increased yields with the application of nitrogenous fertilizer up to about 50 kilograms of nitrogen.[40/] At this point, the maximum yields of 4,200 kilograms of rice per hectare were obtained. Management of these inputs transferred from a scientifically-managed research station to a typical farm in the Philippines may have yielded from 30 to 50% as much as optimum research results at a research station. Experience in the transfer of IRRI varieties and practices to farms in the Philippines have proven that this percentage is realistic.[41/]

The risks to the farmer of losing his investment and his crop were too great for the margin of income he may have gained by increasing his yield by a few hundred kilograms, which is the amount he probably would have obtained with Peta, if fertilizer had been available and if he had been able to obtain

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40/ "Tenure and Productivity of Philippine Rice Producing Farms", by Vernon W. Ruttan, a Draft Manuscript (65-2 Multilith, University of Minn., Dept. of Agricultural Economics, Nov. 20, 1965, p. 6.

41/ See Table VIII-C, Appendix, Sect. 2 and compare with IRRI tests reported in Table VII.

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the credit at reasonable interest rates and was able to sell his rice at a favorable price. All these factors were against him. There was not an adequately assured profit margin, with all the difficulties and unknowns facing the farmers, for the extra effort in weeding and other practices, and for the risks involved. The dangers in lodging, already prevalent with this variety, particularly to monsoon rains and winds, would increase with a taller stalk which was a characteristic response, if he happened to apply too much fertilizer. While there were exceptions where fertilizer was successfully used on irrigated farms during the dry season under good management, these exceptions were few.

The plight of the subsistence farmer of Asia and the economic trap that bound him to the traditional, primitive methods of farming are eloquently described in the report of the President's Science Advisory Committee on the World Food Situation:[42/]

> "To persuade farmers to accept the techniques of modern agriculture is a formidable and complex undertaking. Farmers in traditional subsistence economies are understandably wary of assuming new risks because they are so close to the margin of survival. If a farmer is to invest in modern inputs of improved seeds, fertilizers, and pesticides that are essential to increasing the output of his land, a system of farm credit must be established so that he can afford to purchase them, he must be instructed in the proper economic utilization of these materials, he must be reassured that he will be compensated for possible losses incurred in the process of innovation, and above all, he must be shown that the potential pay off is worth the risk."

42/ "President's Science Advisory Committee", Vol. I, p. 815, -16. The White House, May 1967.

D-8

The system of land tenure and tenancy influenced investment decisions, too. Dr. Vernon Ruttan explored the implications of the land tenure system in the Philippines on investment decisions in 1963.[43/] His studies at IRRI showed that, under this system, the opportunities for the maximum net returns on investment (at optimum levels of consumption) were greatest for the owner-operator, second best for the landlord (if he shared in the investment), and least for the tenant. In fact, the conclusion was drawn that the margin of return for the tenant was so low that it was not worth the risk involved of losing his cash money through crop failure in making such an investment. Cash was too difficult for him to earn and impossible for him to obtain as credit in most situations.

The Philippine Government has, since 1950, been active in the development of the use of fertilizer. From the period 1930 to 1954, 10 million U. S. Dollars worth of fertilizer was imported under the Economic and Technical Cooperation Agreement between the Philippine and United States Government.[44/]

Importation declined in 1954 but increased in the following year with the beginning of imports by the Sugar Producers Cooperative and Marketing Association (SPCMA), which, at present, is still the largest fertilizer consumer. The Agricultural Credit Administration (now ACA, but then ACCFA) appropriated ₱45,513,000 for fertilizer purchases and distribution over a period of seven crop years from 1956-57 to 1962-63, as was authorized under Republic Act 1609. Purchases were made principally from domestic producers

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43/ Op. cit., Ruttan.

44/ Research Review, Agricultural Economics, draft section for Annual Report, IRRI 1968, by Randolph Barker, dated January 31, 1969.

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and distributed at subsidized prices through farmer's cooperatives, at 50% subsidy. This subsidy was authorized for rice and corn farmers under Republic Act 2084. A total of ₱44,541,000 of fertilizers was distributed under this program. It is estimated that 50% of the fertilizer intended for rice and corn farmers probably was diverted or resold on the black market at higher prices. In 1964, the ACA terminated the subsidy program, but continued the sale of fertilizer through cooperatives at rates comparable to or, in some cases, slightly below the current commercial level. Import duties on fertilizer was removed for cooperatives by Republic Act 3030 in June 1961. However, the major beneficiary was the Sugar Producers Marketing Cooperative Association.[45/]

A survey in 1964 by the Market Research Division of the San Miguel Cooperative showed that 144,000 M.T., 49% of the entire consumption, was being used on approximately 300,000 hectares of sugar cane land. It also showed that 27 percent was reportedly used on 3 million hectares of rice, but little fertilizer actually reached rice farms.[46/]

Government activities, during the period of imports and heavy subsidization of fertilizer use, was competitive to the development of private local production and distribution, especially in the imports of fertilizer, which, in more recent years, have come principally from Japan under reparations. With the curtailment of subsidies, the domestic fertilizer production and distribution industry grew to boost local consumption. The growth of

45/ Ibid., section on Fertilizer Supply and Distribution, pp. 26-28.

46/ Ibid., p. 29.

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fertilizer production and consumption in the Philippines is illustrated in Figure 2.[47/], which was developed in a study made by Randolph Barker of IRRI. The growth was accelerated by the favorable government policies in the curtailment of subsidies and encouragement of domestic production and by the release of the new high-yielding rice varieties.

The development of IR-8 at IRRI finally gave the farmers of the Philippines (and Asia) yields that would, at favorable prices, provide the income that is an incentive for them to risk investment. The increase in yields with the use of nitrogen fertilizer was not a small increase, but would double and triple yields. While actual farm experience with yields using the new varieties have been described in another section, research results at IRRI and comparative cost-benefit ratios of the IR-8 and Peta, the traditional Indica type, are dramatically illustrated by the curves in Figure 3.[48/] This curve shows that IR-8 increases in yields with the application of nitrogen up to about 120 kilograms per hectare during the wet season. At this point, yields reach about 6,000 kilograms per hectare. The optimum levels of fertilizer usage, based on varying prices, are shown to achieve benefit-cost ratio of 2½ to 1. During the dry season, the performance of IR-8 (as is true of most varieties) is greater. Maximum yield is reached at about 160 kilograms of nitrogen where yields are on the order of 7,000 to 7,500 kilograms./ The optimum levels for a benefit-cost ratio of 2½ to 1 are also shown for varying prices. Yields in research tests at IRRI have reached as high at 10,000 kilograms per hectare.

47/ Ibid., Figure 7.

48/ Ibid., Figure 3; Figures 4 and 5 show records of yield tests at IRRI for 1966, 1967, and 1968 (Figures 2a and 2b in IRRI Report).

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Many fertilizer trials have been carried out in different localities of the Philippines. In addition to IR-8, other promising HYVs, especially IR-5 and C4-63, have been used in such trials. Due to wide differences in soil fertility and climatic factors, results have varied considerably. The following general conclusions can be made however:

(1) All of the varieties tested are more responsive to high fertilizer application during the dry season than during the rainy season due to more intensive sunlight and better water control during the dry period.

(2) In order to obtain maximum yields for IR-8, nitrogen should be used at about 100 to 120 kilograms per hectare.

(3) The HYV varieties respond best under well-managed water application, where water can be maintained at proper levels. However, superior yields with the HYV over traditional varieties have been obtained regularly where only water is available from the immediate rain (rainfed). Even without fertilization on fertile soils, IR-8 has outperformed traditional varieties, primarily due to the lodging factor of the traditional varieties.

If manufacturers of fertilizer had not anticipated needs, availability of fertilizer would have continued to be a problem in the Philippines. Fertilizer plant capacity had not existed in the Philippines to supply fertilizer of the magnitude used in Taiwan, for example, before 1965. To have imported this amount of fertilizer would have imposed a foreign exchange burden on the government and economic benefits would have been questionable with the limited yields potentials and other constraints existing in the country.

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Limited transportation facilities, lack of roads to link many farms with markets, limited and inadequate storage, both for fertilizer and rice, inadequate processing and handling facilities, the system and organization of markets, inadequate credit institutions and practices, and lack of a capital market had restrained capital investment in industrial and transportation facilities as well as investment for improved farming. The ADB in its survey of Asian agriculture, referred to earlier, pointed to the lack of capital markets as a major factor contributing to lack of development in the 16 underdeveloped countries of Asia which it studied, including the Philippines.[49/] The potential for fertilizer use on rice before HYVs were developed may have been a disappointment to ESSO, or other processors, if they had invested in plants on expectations with traditional varieties.

Fertilizer manufacturers in the U.S. have followed a rule of thumb that they would not move into an agricultural area unless experiments had demonstrated that the application of fertilizer would yield the farmer a 3 to 1 return on his money invested in fertilizer.[49a/] This had not been demonstrated on a sufficiently-wide scale for rice in the Philippines to attract fertilizer investors to consider increasing investments prior to the introduction of the high-yielding varieties. The exceptions on the better irrigated farms had been too small in number for much of a market.

The new high-yielding varieties changed the economic situation in the Philippines for both agriculture and industry. The economic opportunities were readily apparent to all, and farmers and industry have responded alike

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49/ Op. cit., ADB, "Survey of Asian Agriculture".

49a/ Getting Agriculture Moving, A.T. Mosher, Agricultural Development Council, Published by Frederick A. Praeger, New York, 1965.

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to the opportunities, and the Government has been inspired by the results. These have resulted in the generation of a national spirit of cooperation, a change of attitudes, a drive and enthusiasm that have sparked the program in the Philippines and contributed greatly to the progress made in the rice program and expansion of agricultural industries. Furthermore, it has made the farmer receptive to other production incentives.

Fertilizer consumption has increased at a remarkable rate since 1966, which was the first year of extended use of the new varieties, as shown by the figures (Table XII A) which reflect an annual rate of increase of close to 20%:

Table XII-A 50/
Estimated Domestic Fertilizer Consumption
1964-1970

Year	Metric Tons Formulated Fertilizers
1964	294,000
1965	300,000
1966	355,340
1967	375,120
1968	394,000
1969 (Projected)	414,680
1970 "	434,460

There is ample evidence and little doubt that the high-yielding varieties were the major reason for this increase in the consumption of fertilizer. It is also evident that the use of other agricultural chemicals have increased at an equally rapid rate.

50/ Op. cit., Figures submitted by USAID Mission, as obtained from ESSO-Philippines from Quotation in "The Economic Monitor", April 10, 1967, p. 6. See Table XII-C for breakdown of consumption by types for 1964, Op. cit., Golay, Table 27, p. 127.

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First of all, the use of fertilizers and insecticides, and other chemicals were necessary to obtain the potential response that had been demonstrated at research stations. Without these, IR-8, on poor soils, performs equally or little better than traditional varieties, although, as has been pointed out, on fertile soils with a high content of nitrogen, IR-8 without fertilization will produce much more than traditional varieties, partially due to the lodging of the latter. The ideal proportions and quantities of fertilizer elements needed for even the high-yielding varieties vary, depending upon the extent and availability of soil nutrients. Furthermore, a general statement can be made that maximum benefits from fertilizers cannot be obtained unless other management practices--insect control, water management, weed control--are applied in the right balance. Therefore, all efforts have been made to introduce a complete package of inputs so as, in so far as possible, to provide the farmer with the combination of inputs that produce the highest economic returns. Much remains to be done in training of farmers in these management practices.

Without availability of inputs, without the high-yielding varieties, and appropriate prices, all efforts would probably have failed. Too often, governments in developing countries have embarked upon fertilizer use programs without a local supply, without a crop suitable to pay the added cost, without foreign exchange to buy adequate amounts of inputs, and without a pricing system, or other required ingredients. Conditions had changed very little in the Philippines prior to 1965 and before the introduction of the

new varieties. Since that time, however, industry has moved along with the new rice program and the general development program. Fertilizer and other inputs have been made available (most of fertilizers are produced locally) as rapidly as the demand had been created, and even faster. The more favorable policy of Government toward the fertilizer business, mentioned earlier, was an important factor encouraging industry to develop in the Philippines.

An example of the response of the private sector in the Philippines, worthy of mentioning, is that of the production of granular insecticides. In 1965, IRRI released research data which revealed a new method of insecticide application for rice stem borer control. This new technique involved the use of insecticide in granular form which could be broadcast by hand to the irrigation water. Within a year, two firms were manufacturing granular insecticides and had established agencies throughout the country, and one firm was exporting to Vietnam.

The private sector has played a very important role in the rice program. Fertilizer companies have made fertilizer and other agricultural chemicals available, and also have pioneered in distribution and assisted in promoting their use. This has been done through promotion of the high-yielding varieties among farmers, and through providing technical assistance to them in the use of the new input and cultivation techniques required for the new varieties. The agricultural chemical companies, as described elsewhere, cooperated in the distribution of the rice seeds. Private rural banks have

played a key role in the supervised agricultural credit program which facilitated the fertilizer distribution program and enabled farmers to buy the chemicals.

ESSO Fertilizer and Agricultural Chemical Company and the Atlas Fertilizer Company played particularly active and important roles. ESFAC, which had established 200 agro-service stores in 1966, increased its distribution network to about 400 agro-service stores for handling fertilizer and other agricultural chemicals. These were used to distribute rice kits. Over 8000 such kits were sold by ESSO by late 1967. ESSO also created a sales staff of agent-representatives-entrepreneurs who served as extension agents to promote the rice program and train farmers. ESSO employed top graduates of the Agricultural College of the University of the Philippines at attractive salaries as salesmen. Some of these had been given the six-month rice training program at IRRI. Others were trained in the practical art of cultivating rice by IRRI graduates in six-month courses set up by ESSO. These sales-agents became prime movers and innovators in the provinces, working with AID officials and Government agents.

The Atlas Fertilizer Company participated in the use of its country-wide distribution system and distributed over 5,000 of the rice kits. Atlas, which provided fertilizer free for the rice kit pilot programs, had about 280 agricultural supplies dealers throughout the Philippines.

The expansion of the fertilizer and other agro-chemical industries in the Philippines in production and distribution which assured meeting effective

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demand, has been impressive. At present there are 5 companies producing nitrogenous and/or compounded fertilizers in the Philippines. Table XIII-E in the Appendix shows their capacities and actual production between 1965 and 1967.[51] Capacities are considerably in excess of production.

The same agricultural service centers which have taken over the sale and distribution of most fertilizers have also been responsible for an increasingly widespread use of agro-chemicals. Until the advent of these new farming methods, few farmers could afford the use of insecticides. Except at one or two large sugar centrals, the use of herbicides were unheard of. Various insecticides, such as Diazinon, Endrine, Sevin and DDC are processed within the country into a number of formulas and/or mixtures. The use of MCPA, 24-D and Treflan for the control of weeds in rice is becoming increasingly common. In corn production, many of the larger producers are using Atrazone routinely.

Table XII-B below which shows the value of Philippine insecticide imports for 1967 and 1968 and projections for 1969 and 1970. The expansion of insecticide use is projected at an annual rate of increase of 20%. Figures on local production and total consumption are not available.

Table XII-B[52]
Philippine Imports of Insecticides

Year	Value
1967	$ 5,100,000
1968	6,100,000
1969	7,150,000
1970	8,150,000

[51] Statistics submitted by USAID Mission.

[52] Ibid.

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The growth of the distribution system was as important as growth of production of fertilizer. IRRI made a survey of the distribution system in 1968, which showed its growth and different methods of distribution by the various companies and a Government agency, the Agricultural Credit Administration (ACA). The growth pattern is shown in Figure 6.[53/]

ACA has 155 local warehouses, and about 130 district fertilizer agents who serve as liaison officers between the farmers' cooperatives (FaCoMas) and the district warehouse. Because of lack of personnel, the district farmer agents are more often salesmen than liaison officer. Where there are no active farmer cooperatives, outlets are designated by the ACA branch office. In general, ACA attempts to cover those areas not covered by private agents. The private sector handles most of the distribution of fertilizer; and insecticides. There were 1402 outlets in 1968 where farmers could obtain supplies. The Government policy, mentioned earlier, established in 1966, aims for the private sector to eventually take over the fertilizer distribution industry.[54/] ACA distributed approximately 800,000 bags (44 kilograms each) of fertilizer in 1967-1968.[55/]

The system of distribution varies among companies. ESFAC appears to be the only company which has made direct contact with farmers. This is done through its commissioned sales agents who act, to a degree, as extension agents, as mentioned earlier, and through ESFAC's employed field staff of professionals who supervise farm demonstration activities and workshops by

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53/ Op. cit., IRRI-Barker 1968, Fig. 8; See Table XII, Appendix, and Table XII-C

54/ Fertilizer Imports are shown in Table XII-D.

55/ op. cit., IRRI-Barker-1968.

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the agents. The demonstration work involves farmer-cooperatives who conduct tests, according to practices recommended, which are demonstrated to other farmers on field days. Workshops for farmers are held to explain the government and private credit systems, and farm management practices. ESFAC reported that, during 1967, its agents held over 200 demonstrations in 48 provinces with over 18,000 farmers attending on field days. Fertilizer sales in 1967 for ESFAC increased by 147,000 M.T. over those of 1966.[56]

Another very important service performed by ESFAC is its soil sampling service. Of this, ESFAC established one of the most modern soil testing laboratories in Asia. Eight thousand samples for over four thousand farmers were analyzed in 1967. Recommendations on fertilizer usage were made to the farmer on the basis of the analysis.

Credit for fertilizer is obtainable primarily through rural banks and other private banks, ACA, the Philippine National Bank(PNB) and the Development Bank of the Philippines (DBP), and although some dealers have provided short-term credit to farmers who have proven their management abilities. Fertilizer companies do not provide credit to dealers or farmers. The Central Bank, through its Rural Banks, extended credit to farmers amounting to ₱409,538,172 in 1968, as compared to ₱355,809,810 in 1967. According to RCFCC statistics, total agricultural loan extended to farmers by Government credit institutions in FY 1968 amounted to ₱546.6 million.[57] With the addition of loans extended by private banks (Rural Banks and others) total institutional credit amounted to more than 1,000 million Pesos for FY 68.

56/ Op. cit., Burgett.

57/ Ibid.

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As to the types of fertilizer used, mixed fertilizers and urea made up a considerable share of total consumption (see Table XV-A). 58-a/ According to Barker's study at IRRI, the nutrient content of a ton of fertilizer may have increased by as much as 30 per cent due to a shift to high analysis formulations. This indicates a growth rate of approximately 10 per cent over the 17-year period, based on nutrients consumed.[58/]

The distribution system, the competition among dealers, and the steady supply of fertilizer have made a stabilizing effect on the prices to farmers. The prices vary by regions according to transportation costs. In general, they are higher than prices that would be afforded by fertilizers produced by the more competitive, large, integrated complexes in Japan and the U. S. However, for this premium in prices, the farmers are receiving invaluable services and the outflow of scarce foreign reserves are being minimized.[59/]

Competition from overseas in the fertilizer business has had its effects on the industry in the Philippines, in addition to the importation of reparation fertilizer from Japan, mentioned before. This has forced prices down somewhat and reduced profits of the industry. Furthermore, the industry is experiencing growing pains, shut-downs, necessitating outside purchases of fertilizers to meet commitments, and the inefficiencies of operating at reduced capacities (less than 50%). The Philippines is likely to remain a high cost producer of fertilizer. This would tend to place rice

58/ Op. cit., IRRI - Barker, 1968.

59/ See Table XIII, Appendix; Ibid., Table 15. See also Table XIV for companies and agents, Ibid., Table 12.

58a/ FAO YearBook 1966.

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farmers at a comparative disadvantage to farmers in some other Asian countries, which could affect export trade, aside from the additional burden that could be placed on the Governmentof maintaining an equilibrium between domestic prices and international prices of rice.[60/] However, availability of water for irrigation, other environmental factors, and availability of domestically produced fertilizer (reduction in foreign exchange requirements) are more important factors affecting comparative advantages.

Projected Requirements Agricultural Chemicals

The question arises of needs and availability of fertilizers and insecticides to meet future expansion of irrigated areas, and increased multiple cropping of the new varieties. Golay treated these in his studies on rice requirements.[61/]

Golay chose to isolate "agro-chemical inputs" rather than to treat them as a package with irrigation and management, as they would actually be in practice. Therefore, he came up with the yield and production contribution that the inputs of fertilizer, insecticides, and new seed varieties could make to increase rice production. He estimated that paddy rice production can be increased additionally by the addition of these inputs by 2,484,000 M. T. over that resulting from new irrigation in his Projection I (1,230,000 hectares additional). He estimated in his Projection II that production can be increased by an additional 3,707,000 M.T. by 1990 by use of these inputs. No. 1 would give 35% and 57% of additional requirement of rice in 1990 for the low and high rice production requirements, respectively. For irrigation Projection II, the low and high rice requirements would be 62% and 74% respectively.

60/ See Table XV, Appendix, which shows ratios of prices of rice to cost of fertilizer in several countries of Asia in 1964.

61/ Op,cit., Golay; see Table XVI - (Table 23 Golay)

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In Golay's projection of estimated requirements of fertilizer by 1990, a total of 206,946 M. T. of nitrogen nutrient equivalent would be required for the additional irrigated area of 2,637,000 hectares required under his Projection I. A total of 283,996 M. T. of nitrogen equivalent would be required on the 3,526,500 hectares of irrigated land under his Projection II. In terms of fertilizer, the first estimate would amount to approximately 459,800 M. T. of urea (45% N); the second estimate would amount to approximately 600,000 M. T. of urea.[62/]

Applying fertilizer use to figures related to land area used in this report of:

(1) 3,000,000 hectares of land in rice cultivation of which
1,011,000 hectares are designed to be irrigated, and
1,989,000 hectares are rainfed;

(2) assuming 33 percent of the irrigated land will produce two crops and the balance only one crop per year. Therefore,
1,347,630 hectares ofrice per year would be grown on irrigated land
and 1,989,000 hectares of rice would be grown under rainfed conditions.

(3) assuming 100 kgs. per hectare of available nitrogen nutrient for irrigated and 80 kgs. per hectare for rainfed land, a potential need of 497,330 M. T. of urea fertilizer per year by 1980 can be predicted.

62/ See Table XVII, Appendix; Ibid, Table 24, p. 124

4. Agricultural Credit

Agricultural credit is discussed in this section dealing with inputs because credit is an essential input in agriculture. Institutional factors of credit are also dealt with here. Credit is essential for the purchase of other inputs, particularly seeds, fertilizer and other agricultural chemicals and equipment.

To make it possible for farmers to meet the higher cost of inputs needed for growing the new varieties, a program enabling them to get credit at reasonable rates was essential. The genesis of such a program was to be found in the pilot agricultural credit program worked out in the provinces of Laguna and Tarlac. In each of the provinces, a loan of ₱125,000 ($31,250) was made to a private rural bank for re-lending to farmers under supervised credit arrangements. Trained agricultural technicians from the Central Bank were furnished to assist farmer-borrowers. Over a million Pesos were subsequently loaned by the above-mentioned rural banks under this program, with a near-perfect record of repayment in these pilot areas.

The success of this pilot project and the knowledge obtained during its operations led to the establishment of the Agricultural Guarantee and Loan Fund (AGLF) in August 1966, through an initial capitalization of 5 million Pesos provided by the National Economic Council (NEC) and USAID out of PL 480 proceeds. Subsequent contributions from the Rice and Corn Production Coordinating Council (RCPCC), the Government Service Insurance System, and the Security System increased

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the fund to 29 million Pesos. The Vice President of the Philippines later petitioned the Philippine Congress for an additional 21 million Pesos to support the program. By the spring of 1968, a total of 22.7 million Pesos had been released, of which 14.6 million had been used for short-term production lonas. One million Pesos had been released for commodity financing, and 7 million had been used as backstop funding for the International Bank for Reconstruction and Development (IBRD) Farm Mechanization Program of the Central Bank. By early 1968, a total of 173 rural banks were extending AGLF loans, 102 of which were in the Priority I rice producing areas. During the first year of AGLF operations, 6,951 borrowers in 32 provinces had increased their rice yields by an average of 37.2%.

Through the Agricultural Loan Fund (AGLF) the Central Bank of the Philippines makes special time deposits in participating rural banks in the Priority provinces, enabling these banks to extend supervised agricultural production and commodity loans to small farmess. The AGLF also provides a guarantee in favor of the participating rural banks to insure against losses of up to 70% of the portion of any loan determined by the Central Bank to be uncollectible. As a result of this program, the rural banks are now far more willing to make loans to farmers. In many cases, theonly collateral required by the banks is a lien on the farmer-borrowers crop.

Supervised credit is a vital element of the AGLF credit program. Trained technicians, employed and paid by theCentral Bank work through rural banks with farmers in developing farm plans and budgets during the rice growing season, in adopting and applying modern agricultural

practices. In a majority of cases, farmer-borrowers rarely see any of the cash proceeds of their loans. Instead, they are given purchase orders authorizing them to procure seeds, fertilizer and other commodities from farm suppliers. The suppliers, in time, bill the bank for the cost of the commodities whereupon the bank reimburses the suppliers and debits the loan account of the farmer. In many areas, private agro-business firms have established stores near rural banks to ensure ready availability of production inputs needed by borrowing farmers. The Central Bank, in addition to providing its own small but highly effective supervisory services, supplements the salaries of selected agriculturists from the RCFCC participating agencies. These technicians receive extra incentive pay from AGLF earnings, plus assessments made on participating banks. This incentive has increased the GOP farm technicians' efficiency and interest, and has given new life to the entire farm credit program.

Private credit was also made available by the rural banks to some supply stores to enable them to establish inventories of fertilizer and other agricultural chemicals. ESSO representatives have emphasized the importance of this type of credit to the program. The private fertilizer industry was not capitalized and organized in the Philippines to handle this kind of credit on an extensive basis.

An important feature of the new credit system was its production orientation, not requiring land collateral. This opened up opportunities to the vast population of tenant farmers who are benefitting for the first time to any extent in institutional credit.

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Credit was available to peasant tenant farmers in the past through landlords and money lenders. Interest rates are said to have run as much as 25 to 30 percent for credit for one month, and sometimes reached as high as 300 percent per year. Lacking collateral, the tenants had no other source of credit. With the introduction of the new technology which has proven profitable even for tenants who must share their profits with landlords, new sources of credit have become available, not only through the Government's program of guaranteed loans, but from the rural banks' independent funds. Improved performance of small farmers using the HYV and new techniques have given confidence to rural banks of their credit worthiness.

Interest rates have been established at 1% per month for production credit. Another favorable feature of loans, under the AGLF plan, is the provision that up to 25 percent of the loan may be used by the farmers for subsistence and medical expenses. Thus, the farmers are provided means to carry their families over to the next harvest. This is particularly important to tenants who have had to depend on landlords for such assistance in the past, but are now breaking away from this relationship.

Availability of credit has been a key factor in the successful adoption of new high-yielding rice varieties. This has gone hand in hand with the availability of technical advice. In the land reform areas, agencies of the National Land Reform Council (NLRC) have jurisdiction over nearly all agricultural activities operations of agencies not directly under land reform are very limited. In these areas, it is clearly demonstrated that these two factors, credit and

technical assistance, are important. The Agricultural Production Council (APC) is the extension arm of Land Reform. Its representatives have not been too successful in their program of encouraging farmers to adopt high-yielding seed varieties nor have they been able to offer the farmer competent technical farm management assistance. In some cases, farmers in these areas have requested and received assistance from the Central Bank technician assigned to the rural bank, and in these cases the results have been more satisfactory.

When the newly-converted leasehold farmers in the land reform areas have been able to find dependable sources of credit and satisfactory technical assistance, they have been able to increase their income, and appear to be satisfied with their status. When the reverse is true, the farmers, being deprived of their former landlord-patron without a satisfactory "replacement", are not content with their new status. Therefore, the availabilities of both dependable credit and competent farm management technical assistance are important factors in the land reform program, and are essential for its success.

These same factors, credit and technical advice, have proven to have had the same importance in adoption of the new technology and rice varieties in non-land reform areas, also. In attempting to observe differences in adoption between the two areas, so far, there seems to be no consistent pattern. The variations in environmental factors, along with credit and technology, appear to be the influencing variables. From this, one could conclude that they are, therefore, more important than the present system of land reform in agricultural development.

The rural banks, which are private family financial enterprise operating under charters granted by the Central Bank, are emerging as key focal points for coordinating the many disconnected activities of government, where the banks have been active. In such cases, they are providing active, progressive leadership in community development. USAID estimates that about 40% of the 192 banks which have granted credit under the ACLF loan program (not all rural banks participate in this program) have developed such leadership. Many of these banks are new in the business, and are managed by new entrepreneur some of whom are showing vision in the economic importance of the new agricultural development. In such banks, credit has developed outside the guarantee program. Some of the newcomers were unsuccessful, and others are gaining experience and benefitting from training programs provided by the Central Bank. AID personnel have found the rural banks valuable reference points and foci for their activities, which often must be shifted from one agency to another in rural areas in search for an active, progressive, change agent with whom to work. The technical field staff provided by the Central Bank have been a good source of this type of person. They are limited in numbers.

Credit is provided by ACLF participating banks to tenants and operators alike. For example, records of the Rural Bank of Mexico, Inc., Mexico, Pampanga, in a land reform area, show that loans were extended to the following type of borrowers during the years shown:

	1967	1968
Tenants	109	182
Lessors	282	512
Owner-operator	18	22
Total	409	716

This bank was an AGLF participator. AGLF loans extended during the periods were the same number as above. Total amounts under the AGLF program were 541,000 Pesos in 1967 and 653,716 Pesos in 1968. Thus, the average loan per borrower was 1,322 Pesos in 1967, and 916 Pesos in 1968. Net farm income of the above borrowers increased by 128% in 1968 over 1967. Average net income per borrower was ₱1036 in 1967, and ₱1353 in 1968. This was an increase of approximately 30%. Records of net incomes were as follows: 1967 = ₱423,805; 1968 = ₱968,840. This is a good indication that in addition to credit supplied by the bank, farmers were supplementing production costs with savings from the previous year.

The loans were extended for growing new varieties of rice, mung beans, vegetables, sugar cane, and some traditional rice. Records of production were kept for each farm. There were 952.5 hectares in HYV rice on the farms in 1967 and 1287.[illegible] hectares in HYV in 1968, or approximately 2.3hectares per farmer in 1967 and 1.7 hectares in 1968. Average yields were 68.76 (3016 kilograms) cavans per hectare for 1967 and 100.2 cavans (4402 kilograms) for 1968.

Income records and disposition of net income were kept on all farms.

Records of repayments were not shown, in the report but were said to have been high for 1967, except for a few crop losses from floods from the typhoon, which were recovered in the subsequent crop. Repayments for 1968 were said to be on schedule but not completed as rice was still

being processed and sold in early 1969. Expenses of farmers included various agricultural chemicals and supplies for operational purposes. Disposition of net income in some instances included such things as purchases of irrigation pumps, investing in an auto repair shop for a son, and improvement in housing. This later showed up frequently in the recor

It is pointed out that the Mexico Rural Bank is one of the outstanding ones in the country. It is understood that many other rural banks have not done as well.

Many successful farmers are now able to self-finance their operations, and have new savings accounts in banks [illegible]. The Mexico rural bank reported that deposits have increased from farmers by several fold. Figures from the Central Bank show that deposits in rural banks throughout the country increased from ₱100,827,928 to ₱141,877,507 during the period December 31, 1966 to December 31, 1967. This represents an increase of 40% during a one-year period.

The Central Bank through its Rural Bank reports that Agricultural Credit extended to farms in 1968 amounted to ₱409,538,112, which was a considerable increase over 1967 with ₱355,009,810 Pesos. According to RCFCC statistics, agricultural loans extended to farmers by government credit institutions amounted to ₱546.6 million during 1968.

No records are available on performance repayments of AGLF funds, or how these funds have been managed as a whole. While no instances are known of the use of the Central Bank guarantee fund in replacing losses, this is no indication that there may have been many. The only basis of overall judgment of the program is that credit availability to farmers

has improved and this has benefitted the farmers and the rice production program. Lack of credit has not been a bottleneck in the program, yet.

The numbers of well managed progressive rural banks whose management are providing development leadership to the rural communities and management assistance to the small farmers may not be great. However, the few that have done this have definitely demonstrated a potential economic and social role that they can provide while conducting a successful private business enterprise. These examples should serve to guide government in its development program and technical assistance efforts in rural areas to foster and assist this movement.

Credit needs of the rural areas are by no means all being met by rural banks. Nor, is it assumed that these institutions will expand to meet all current and future needs of agricultural credit. The ACA program for (FACOMAS) have been important in providing credit for members as well as in warehousing and the distribution of farm supplies.

The FaCoMas have served as channels to farmers for agricultural loans from the Agricultural Credit Administration. These production loans were made for fertilizer and other agricultural supplies. The FaCoMas extended 30,252 loans, amounting to ₱19 million Pesos in 1968. Following is the record of loans of the FaCoMas in the program since 1964:

	1964-65	1965-66	1966-67	1967-68
Number of loans	7,682	10,348	22,397	30,232
Total loans	₱3.2 mil.	₱4.9 mil.	₱12.6 mil	₱19.2 mil.
Average loans	₱416	₱473	₱562	₱634

Many of the originally organized FaCoMas did become inactive. But others have remained active. The numbers of active ones have been increasing during the last few years. A notable increase was made during 1967-1968. The number and status of FaCoMas are shown below:

	1964-65	1965-66	1966-67	1967-68
Registered Agricultural Cooperatives	547	578	602	626
Total Membership	312,000	314,000	352,000	360,000
Authorized Capital	₱35.7 mil.	₱42.2 mil.	₱48.9 mil.	₱51.0 mil.
Paid up capital	₱ 7.2 mil.	₱ 7.8 mil.	₱10.5 mil.	₱11.3 mil.
Active FaCoMas	110	121	129	141
Active members	16,870	28,040	32,880	47,352

AID has selected the 10 best FaCoMas on the basis of performance and area of operation for assistance by providing financing with a ₱6.0 million loan fund through ACA for increasing their activities in the rice program.

Selected FaCoMas	1967-1968 Production Loan Releases
Cabanatuan City	₱ 786,705
Tarlac, Tarlac	638,176
Echague, Isabela	858,160
Midsayap, Cotabato	534,237
Lambunao, Iloilo	113,395
Rosales, Pangasinan	580,805
Alicia, Isabela	328,735
Guimba, Nueva Ecija	962,855

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Selected FaCoMas	1967-1968 Production Loan Releases
Malasique, Pangasinan	₱ 167,539
Tacurong, Cotabato	421,305
Total	5,811,912

The problems faced by the FaCoMas have been lack of capital and an effective central marketing organization. USAID is assisting in financing with ₱4 million to the Grain Marketing Cooperative, GRAMACOP, which is the national grain cooperative federation. It purchases grains from the FaCoMas and distributes to outlets, but has been limited in its operations by lack of capital. Its volume of sales last year was ₱2,259,935.

While advancement has been made in agricultural credit during the past three years, institutional credit needs are not being met. There is still a shortage of short-term production credit. Many farmers are still having to depend on more expensive, non-institutional credit: money lenders, pawn owners, relatives and rice dealers. This type of credit is too short in term, and too expensive for investments of the type required in improved techniques that are being introduced.

There is a shortage of medium term credit for capital equipment for small farms. There is also a shortage of medium and long term credit for capital investment by private enterprise for agricultural industries. The Development Bank of the Philippines and the Philippine National Bank do make provisions for some credit on 3 to 10 year terms at 10 to 12% per annum interest.

The IBRD has provided assistance in farm mechanization. A loan of $5 million was made in 1966. This is currently being refinanced by an additional $15 million.

Farm

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SECTION 7

5. Farm Mechanization

Historically, cultivation and production of rice in the Philippines has been labor-incentive. Crude hand tools have changed very little over the past several generations. The carabao (water buffalo) has been the principal beast of burden used in land preparation and in transportation. Techniques used in the sequence of operations, necessary for the production of rice, had been developed over the years and had become static. Production per unit area and per family group had become routine and stabilized. The farming operations such as land preparation, planting, and on to the storage, marketing and handling, were performed on a fixed schedule. This schedule was designed to coincide with the weather cycle and timed to the rainfall pattern. Rice planting was so scheduled as to mature and be harvested in the dry season when the sun and low humidity would permit natural drying. The physical areas for drying were adapted to the quantities of rice produced by a family.

The primitive system of farming with all its inefficiencies could scarcely yield more than subsistence requirements and pay for the cost of land. The average peasant farmer was caught in an economic squeeze by a social structure of land ownership and tenancy and imperfect market system that were exploitive of his labor and offered no incentive to him to produce beyond his subsistence requirements.

The release of the high-yielding varieties offered a solution to the problems of increased production, but these very production capacities and other characteristics created new problems for the rice producer: short-growing periods, which meant harvesting during the rainy periods; non-seasonal characteristics of the rice plants, which meant that crops could be planted at any time during the year and short maturing period creating possibilities of 2 to 3 crops per year; thus emphasizing the need to prepare the land for re-planting in the shortest time possible; and more even distribution of labor requirements throughout most of the year on each farm, thus increasing the efficiency of farm labor, but reducing the possibility of sharing labor forces among farms during peak periods. These new problems and others emphasized the need to utilize machines and mechanical devices wherever possible and feasible in the agricultural processes.

Many informed persons in the Philippines, aware of the existence of extensive methods of cultivation of grain in the U.S., where large equipment is used, have expressed the feeling that the solution to the problems in rice production, processing, handling, and storage on the farm in the Philippines lay in the introduction and use of large combines and other large machinery and facilities. However, there are sociological and economic factors that render such an approach unfeasible at present, as far as the farm operation is concerned. These factors include the organization and operation of farming of small farms by the farm family, the farm lay-out for paddy rice cultivation, the cropping pattern, tenancy practices, an economy whose population is predominantly rural and dependent on agriculture for subsistence, and built-in

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investments in present facilities for processing and storage. Therefore, USAID is concentrating its efforts to improve the operations of the small family-sized farms and system of farming by promoting technology and equipment that are simple, practical, and adaptable to the current system.

The farmers of the Philippines have quickly recognized the increasing need for mechanization to handle the new problems as rice production increased. They began to invest capital in tractors and mechanical power. Some of this investment was carefully thought out and proved successful. However, this was not always true. Many people had sad and, sometimes, costly experiences when wrong or ill-adapted machinery was purchased. The small two-wheeled hand tractor appeared to be a logical replacement for the carabao. However, in some cases, this did not prove to be economical, on an hour-to-hour, or a hectare-to-hectare basis of comparison. When continuous output or speed and timeliness are controlling factors, the machine has excelled.

It has been estimated that there were over 5,000 hand tractors in the Philippines as of June 30, 1968. Most of these were in the hands of the small farmers who have land under irrigation capable of producing two crops of rice per year. The machines are used for land preparation on the owner's farm, and in addition, for custom work in land preparation on neighboring farms. They are also used sometimes as power to tow carts loaded with commodities. Under these conditions, the use of these machines are economically successful.

Most of these small tractors are of Japanese manufacture. Similar models, manufactured in the U. S., have not been designed for use in paddy rice conditions and have not proven too successful. However, U. S. manufacturers are beginning to take cognizance of this market, and are expending research funds for design and development of a machine that will compete.

In addition, it is estimated that there are over 7,500 standard tractors in the 35 H.P. range and greater in the Philippines. These tractors, for the most part, are on the large farms and sugar haciendas. However, many are engaged in custom work of land preparation and cultivation for other crops, including rice, and as power units on other equipment. All of these units are also used a great deal in transporting goods and produce to and from farms including rice from rice farms.

Threshing of paddy rice is done in the Philippines by (a) trampling by humans or animals, (b) beating against a log or rack, (c) flailing, and (d) utilizing a locally-produced version of the old McCormick Thresher-Separator. The first three of the above are very labor-intensive and slow. The Thresher-Separator is too large for the average farm operation. It is suitable in capacity and cost for custom work by an entrepreneur or for cooperative ownership. All of the above require fairly dry grain and climatic conditions.

The McCormick thresher-separator has been copied and is being locally produced. However, each machine is customed made by hand in small shops which makes the price quite high, over $7,000. Shop capacity is usually

not more than 8 to 10 units per year. The use of this machine requires that the rice be harvested and transported to an area accessible to the machine. There, the rice is placed in stacks where it remains until the thresher is available.

Several serious problems have arisen in drying and threshing with the introduction of the HYVs. Grain harvested and stacked during the wet season has deteriorated, in some cases completely, by heating and sprouting in the stack. Other serious losses have occurred when rain and wet weather have made it difficult to harvest and transport the paddy rice from the field. All in all, the threshing of paddy has been a problem area where great losses occur in handling and spoilage.

Engineers of U.S.A.I.D. and I.R.R.I., which is working under an AID contract to do research on rice farming equipment, have been working on these problems. They have designed and produced a drum-type power thresher aimed at alleviating some of these problems. Three Philippine manufacturing companies are presently producing these threshing machines, which are priced at approximately 2,500 pesos ($625). They are light and portable, and operate in wet conditions. A smaller thresher is presently under development and test at IRRI that will be even more portable and cheaper in price, but it will probably not be produced commercially until next year.

The problems encountered as a result of the characteristics of the HYVs and the necessity of mechanical drying and improved milling techniques and equipment is discussed in section 8, marketing, storage and processing.

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SECTION 8

C. Economic, Social, and Political Factors

1. Profit to the Farmers

The incentive that the use of the HYV offered in increased yields , and, with the favorable prices, increased net incomes to the farmers, is the single, most important factor that has brought success to the rice program. While other factors discussed in this report were necessary to enable the farmers to change, profit was the factor which motivated him to change. This motivation necessarily had to be great, as mentioned before. The prospects of a small increase in income was not adequate for the risks involved to his subsistence. The possibilities of doubling or trebbling yields and income were necessary. The net income to the farmers was, of course, a combination of prices for the rice, yields, and cost of inputs. The cost of fertilizers was covered in a previous section. Overall costs and returns will be covered in this section.

The figures generally used on yields of the HYV in the rural areas by extension agents and fertilizer dealers in demonstration work with the farmers are the important ones which influence their decisions. In ESFAC's 44 farm demonstrations, the figure of about 100 cavans (4400 kilograms) has been used by ESFAC agents as the expected yields with HYV with their recommended fertilizer practices on irrigated land. 63/

63/ Op. cit., Burgett ; $ 1 - P 3.0

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The high-yielding varieties have produced with fertilizer 60 cavans more per hectare then traditional rice in rice plots in those tests. Based on these results, they have calculated that increases have meant that almost 8 ₱esos were obtained as additional income for every ₱eso spent on correct fertilization (at the government price of 16 ₱esos per cavan of palay). The farmer would spend 5 x 22, or 110 ₱esos for fertilizer on a hectare of land which would earn him 960 ₱esos gross or 850 ₱esos above the cost of fertilizer per hectare per crop under established rentals which specified 9 cavans per hectare. While this did not reflect his net income, it was the profit expectation of the farmers and influenced them to invest in the fertilizer. 63a/

The HYV offered additional potential to the farmers because of shorter maturity (120 vs. 160 days for traditional varieties), permitting two crops per year on some irrigated land with an additional crop of vegetables in between. So the income calculated above for rice would be double, plus what the farmer could earn on vegetables, which with two years of experience, has proven to be more lucrative in some areas adjacent to urban markets than the income from a single crop of rice. However, in the introductory phase, it has been the difference in income of one crop of rice that won the farmers over from traditional varieties.

Traditional varieties yielded a national average of about 35 cavans (1540 kilograms) of paddy rice per hectare on irrigated, wet season crop, and about 27 cavans (1188 kilograms) per hectare on non-irrigated, wet season crop during 1960. 64/. Assuming no costs for chemical

63a/ Ibid; $1 = ₱3.90; palay= paddy or rough unmilled rice.
64/ Op. Cit., Golay, p. 109

inputs, cash income would have been that derived from sale of the marketable surplus, being that amount remaining after deducting subsistence requirements and rice for rental payment to landlord, if a tenant. On a 2.4 hectare farm, the farmer on the irrigated land would have had 25 x 2.5 = 87.5 cavans per crop x 2 = 175.0 cavans per year with two crops, or 7700 kgs. For subsistence he would need about 100 kilograms per year of milled rice per person or 154 kgs. of paddy, which would be equivalent to 3.5 cavans of paddy rice. For a family of 7, he would need 24.5 cavans, and if he saved his own seed he would retain another 6 cavans, making a total of 30 cavans. He would have to pay his landlord 44 cavans for rent (25%), making a total of 74 cavans, leaving him 101 cavans to sell. At 16 Pesos, he would receive total cash of 1184 Pesos amounting to 474 Pesos per hectare for 2 crops, or 237 Pesos per hectare per crop. Therefore, the average traditional farmer on irrigated land, using traditional rice and no fertilizer was comparing a net cash income of 237 Pesos per hectare per crop in 1960 with a net cash income of 850 Pesos per hectare per crop using the HYV and fertilizer on irrigated land. In this example, no allowance was made for any cash outlays for labor, credit, or other inputs other than fertilizer.

The farmer on rain-fed land, normally the less fertile, was in a much less favorable position in 1960. With 27 cavans per hectare per crop, which was his only crop on that land during the year, the farmer would produce 67.5 cavans on a 2.5 hectare farm. Making the same deductions for seed and subsistence for a family of 7 (30 cavans), deducting 25% for rent, if a tenant, the farmer would have no rice to sell. In fact, he would lack 6 cavans of meeting requirements

Therefore, he would have to reduce the allowance for subsistence by 6 cavans in order to have seed. Instead of eating 100 kilograms of milled rice per person per year, the family would consume 74 kilograms per person, per year. If the farmer derived any cash at all from the sale of rice he would have to further reduce family consumption, or sell some of his seed. This was the plight of the average subsistence peasant farmer on non-irrigated rice farms in the Philippines with an average crop (1960), which was true of much of Asia.

With this prospect, it should not have been surprising that many subsistence farmers adopted the high-yielding varieties of rice on non-irrigated farms, although the RCPC had not included them in their original plans. They were omitted because the Government did not know what the performance on the HYV would be on such lands, according to Col. Osmundo Mondonedo, former director of RCA. The potential income was sufficiently attractive to warrant the risks if the farmer was able to obtain credit to purchase the inputs. The cost of such credit was, of course, another factor influencing the farmer's decision. Farmers adopting the HYV were able to obtain credit at 12% per year interest.

The method of communicating the possibilities of profit potential to farmers was important. The farm demonstration test on selected farms described for the ESPAC program was the same method developed in the two pilot areas of Tarlac and Laguna and used by the RCPCC through out the 12 provinces. Farmers had faith in seeing results on other farms not unlike their own. Demonstrations of such results at a well-equipped modern, and scientific research station would have meant little to the

farmers, because they could never hope to duplicate the methods. Nor could the profit potential have been communicated successfully to the farmers by mass media, as has been attempted in many countries. Once demonstrated on their terms, the farmers were quick to respond to profit motives, which disproves a mass of disbelief held by many people, and expressed in much literature about the response of peasant farmers in developing countries to profit incentive, and about their contentment with their earnings. An important point is that it took a heavy dosage of profit potential to induce farmers to take the risk.

For more scientific methods of calculation of cost-benefits, we look to IRRI where these methods were used to determine the feasibility of the varieties during research tests. The first of such published calculations was made from test with IR-8 in 1966 at the Maligaya Rice Research and Training Center, during the wet season. This was on irrigated land, as most of such tests have been. Using a palay price of Pesos 0.36/kg. (15.84 Pesos per cavan) and nitrogen at 1.18 Pesos per kilogram of N (from Urea), benefit-cost ratios for varying levels of nitrogen application were calculated. The test showed the optimum level to be 120 kilograms of total nitrogen, which yielded 6308.3 kilograms of paddy rice per hectare. 65/

Much more comprehensive studies were made by Randolph Barker at IRRI among 155 farmers in Laguna Province during 5 crop seasons in the years 1966, 1967, and 1968. The studies covered a number of physical,

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65/ See Table XVIII;
Op. cit., IRRI - Barker, 196/, Table 3, p.18.

economic, and sociological factors related to the adoption of new rice varieties among the 155 farmers who cultivated irrigated and non-irrigated land. These studies reflect the price changes of the different varieties, yields, variable costs, and the influences of prices on the decisions of the farmers during these 5 crop seasons. 66/ Of particular economic importance, the studies showed that, while the new varieties out-yielded other varieties, the price differential that had developed between them and a special variety yielded a greater income to the latter, the Malagkit which is a special, glutinous variety used for making cakes and pastries for special occasions. The prices ranged from 12.50 Pesos per cavan for IR-8 to 23.50 Pesos per cavan for the Malagkit in 1968. This price differential had apparently developed during the dry season of 1968 and influenced 15 of the original adoptors of IR-8 in the Laguna sample to shift to the Malagkit during the following wet season of 1968. 67/ It should be noted, however, that there is a limited market for this particular variety. The example further illustrates the responsiveness of farmers to prices. It also shows that some farmers, usually the more progressive, are quicker to respond and are leaders in change.

Another interesting economic observation was the outstanding performance of IR-5 and C4 during the dry season of 1968 on 16 and 93 farms, respectively. IR-5 yielded 162 cavans per hectare (7130 kilograms) and C4 yielded 98 cavans (4310 kilograms). While IR-8 yielded 106 cavans (4660 kilograms), the other two earned greater incomes because of the price differential. The price ranged

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66/ See Tables XIX, XX, XXI, XXII, XXIII.
Appendix, Op. cit., IRRI - Barker, 1968, Tables 1, 2, 3, 4, 5.

67/ See Table XXI, Appendix., Ibid, Table 3

in Pesos per cavan: 12.83 for IR-8; 144.44 for IR-5; and 16.04 for C4. Returns over variable costs in Pesos per hectare were 833 for IR-8; 1711 for IR-5; and 1018 for C4.

IR-5 has characteristically out-yielded IR-8 during the dry season under farm conditions where less than the optimum amounts of nitrogen fertilizers are usually applied. However, the reverse is true during the wet season when IR-5 loses its advantage to IR-8 because of some lodging tendency for IR-5. C4 is a promising new variety just released by the UP College of Agriculture. It is supposed to have superior milling and taste qualities, as indicated by its preferential price of 16.04 Pesos per cavan in 1968. 68/

Shifts from the high-yielding to some of the special traditional varieties which have enjoyed higher prices during 1968, have been observed in other areas of the Philippines. However, these do not appear to have significantly influenced the rate of spread of the new varieties, which continued to increase during 1968. It only confirms the price sensitivity of farmers where they have the opportunity to change.

The question arises as to how much influence prices will continue to have on the profit incentive to farmers relative to the continued use of these new varieties. At ₱12.50 per cavan for IR-8, quoted by IRRI, the returns to the farmers over variable cost was still 575 Pesos per hectare on 30 of the 60 farms observed during the 1968 wet season (Table XXI). This is still better than the 237 Pesos of net income, at the higher price of 16 Pesos per cavan in the ESFAC example cited above with the farmer issuing a traditional variety

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68/ See Table XXIII; Ibid., Table 5.

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on irrigated land and no fertilizer and obtaining the average crop yields of 1960 (35 cavans or 1540 kgs. per hectare). At a price of 12.5 Pesos per cavan, the traditional farmer's income would be reduced considerably below the 237 Pesos per hectare.

Therefore, there appears to be some cushion at this price for continuing to use the HYV and fertilizers, although the farmers would shift to a better alternative in a crop variety, if available. The alternative of a shift to a higher priced, specialty rice would have obvious limitations to a large number of farmers, which would only bring that price down if the shift occurred. There is some evidence that vegetables in certain areas for a limited market yield greater incomes, but some of these are grown in rotation with rice.

The farmer on irrigated land in reaching a decision on HYV and pricing will be influenced, as has been indicated, by income from the third crop that can be grown by using the shorter maturing HYV and by comparable water requirements. Remnants of fertility left in soil by the fertilized HYV is important for this third crop, which can be certain vegetables. Reduction in risks from lodging will also be a factor. The farmer on non-irrigated land will be influenced to a less degree by some of these factors.

Alternatives open to farmers are still improving. Recent research developments at the IRRI indicate that within the next season, a still newer variety of rice will be released which combines high yield potential, disease resistance, and high quality grain. Therefore, the problem of poor quality of the early releases may soon be overcome.

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SECTION 8

The critical issue appears to be availability of water for cropping. On less fertile soils at higher levels, where less water is available and soils are more porous, and non-irrigation agriculture is practiced, the amount of water available is a critical factor. The HYV thrives best under aquatic conditions, as is true of most of the rice grown in the Philippines. There are dry land crops such as soybeans, sorghum, corn, mungbeans, and others which yield better in dryer, more porous soils where limited water is available. Use of rice in such conditions becomes marginal.

Thus, secondary crops become important for both food and feed for livestock. However, other problems arise here: markets, development of new types of storage, new processing industries, improved per capita average incomes, and cultural factors appear as obstacles which will have to be overcome. Traditional farmers on the poorest of upland soils are accustomed to growing rice for subsistence. To change this practice to the cultivation of other crops for cash income will require considerable profit motivation. However, now that many of these farmers have probably become more market-oriented, the task should be easier. Nevertheless, markets will remain the largest obstacle. For domestic markets, expansion of feed crops for livestock will be dependent on both, the rate of increase in per capita domestic incomes and decrease in costs of production of feed to lower meat prices. This will necessarily be slow. In the short run, secondary crops for import substitution, and for the export market in the form of fresh and processed products (fruits and vegetables for Japan) appear to offer the greatest potential.

(2.) Prices to Farmers

During the first two introductory years of the HYV, 1966 and 1967, the price of rice to farmers was generally higher than the support price of 16 Pesos per cavan. Seasonal fluctuations brought it down in some remote areas below this level, but the price was generally favorable. The RCPCC was using a figure of 17.50 Pesos to calculate potential income to farmers at that time. Nevertheless, a trend developed during these two years on the price of IR-8, the principal new variety being propagated. A margin of about 2 Pesos per cavan was paid for the traditional rice over IR-8. This was due to the preference in taste and the superior milling quality of traditional varieties. IR-8 was more chalky and tended to break more in milling. This trend in price differential has continued and has widened as the supply of IR-8 increased and the supply of traditional varieties proportionally decreased. In 1968, the range was from 3 to 6 Pesos between IR-8 and most traditional varieties.
The range was greater in the case of fancy varieties whose prices are always higher.

Seasonal variations of farm prices have traditionally been about 20%, being lowest during the months of November, December, and January, which are the traditional harvest months for the wet season, and highest during the months of May, June and July which are the traditional planting months for the wet season.[69/]
The dry season crop had not been adequately large to balance the fluctuation.

69/ Op. cit., Weitz Hettelsater, p. 106; and see figure 7-A Prices, Retail M-2 Manila, and Monthly Palay Harvest, 1956-65-From RCA

69a/ Ruttan estimated the seasonal fluctuations for rice and corn at about this level, concluding this represented costs of storage and holding in a rather perfect market; see "Price & Market Relationships for Rice and Corn in the Philippines", by Mahar Mangahas, Aldo E. Recto, & V. W. Ruttan, Journal of Farm Economics, Vol. 43, No. 3, Part I, August 1966.

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In recent years, the price of rice appears to have reached a peak in 1967 when a decline started, as shown by the curves on the graph, Figure 7 which was prepared by RCA on prices in Cabanatuan City, the major center. The trend downward continued through most of 1968 when it appears to have reached a bottom and started an ascension. During this period, the price to farmers fell below the Government support price by about 2 to 3 pesos, around 13 to 14 Pesos per cavan. 70/

As an example of price performance in one locality during 1968, the farmers' rice cooperative (FaCoMa) in Tarlac quoted the following prices to farmers for IR-8 for the last few months of 1968 and early 1969:

September	-	9 Pesos per cavan of 50 kgs. of wet rice
October	-	10-11 " " " " 44 kgs. of dry rice
November	-	11 " " " " " " " " "
December	-	12 " " " " " " " " "
February	-	15 " " " " " " " " "

The extreme low of September was explained by wet rice being brought in by farmers. Farmers were required to sell at 9 Pesos per cavan of 50 kgs. of wet rice. The new rice when planted early in the rainy season matures before the season ends and farmers did not have mechanical means of drying. The moisture content was about 21 %, whereas 14% is the storable level. Therefore, the FaCoMa had to dry the rice, and farmers paid for the drying, in effect, at the rate of about 2.41 Pesos per cavan of dry rice equivalent, considering the differences in weights of the wet and dry cavan.

70/ Curve developed by RCA, Fig. 7; / See also Figure 7-B, Palay at Cabanatuan City since 1957 (wholesale)

During the 1966 and 1967 seasons, the Government had been able to intervene in market to stabilize, with few exceptions, any abnormal balances that appeared in the farm and retail prices. During 1966, the Government was still importing. It used these stocks to replenish the supply and maintain a normal level. During 1967 when the domestic supply increased, it was actually necessary for the Government to re-export some imports (see Table I-D).

The domestic supply began to catch up with demand during the middle of 1967. This started the downward trend in prices. While Government intervention during 1967 was adequate to prevent a sharp drop, the Government ran into difficulty in early 1968, when the downward trend continued and the RCA exhausted its funds for further purchases. For most of 1968, there was a fairly free market in the rice trade. Prices had fallen below the support level, but were still slightly above world prices. The low retail price level and supplies prevented RCA from selling any of its stocks domestically.

Rice purchased by the Government during 1967 and part of 1968 in its efforts to stabilize prices, had been purchased at about 17.5 Pesos per cavan. After the farm price dropped below 16 Pesos, and the retail price of rice also declined, the Government was unable to sell without taking a loss, which it was prevented from doing by law. Warehouse space had become scarce in 1967 and was still scarce in 1968. This, and lack of funds took the Government out of operations in the rice trade for most of 1968. It had stocks of 10.5 million cavans of paddy (palay) rice (462,000 M.T.) in storage, which would

have depressed prices even further if sold domestically. Although not sold, this supply undoubtedly had a suppressive effect on prices in its influence on private buyers. Whether it would have had a greater or less suppressive effect if this amount of rice had been in the hands of traders is debatable.[71]

In any case, it seems fortunate that the country did not produce more rice than it did during 1968. In this respect, Col. Mondonedo, former Chairman-General Manager of the RCA, says that the drought was a blessing.

In summary, during the introduction of the HYV, farmers had the advantage of very favorable prices, which was above the 16-Peso support level and undoubtedly was a deciding factor in inducting them to change. After two years, by 1968, prices had declined below the support level, and farmers were selling generally for around 13 to 14 Pesos per cavan, according to best estimates.[72] While the 1968 prices may not have been high enough to have introduced a new system of farming, if they had existed in 1966, they do not appear to be low enough to cause farmers to abandon the use of fertilizer and new techniques, including the new varieties.

Looking at the long-range trend of farm prices for rice in the Philippines as shown by the RCA trend curve, Fugure 7, the trend has been upward. From the middle of 1960 to beginning of 1968, there is about a 20% increase. These prices appear to be cyclical and conform somewhat to the trend shown in international prices of rice in Thailand (see Fig. 8). Farm prices of rice in the

72/ Statistics on prices actually paid to farmers (outside the Government support program) are very difficult to obtain. Warehouses usually quote 2 to 3 Pesos higher than what they have actuallypaid, or are paying. The best source is from farmers themselves, which introduces a survey problem. Op.cit. IPRI-1968

71/ See Figure 7-C; RCA cumalative Rice Sales, 1967 and 1968, RCA.

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Philippines during the period of introduction of the HYV were higher than international prices. Today, they are running much closer to international prices.

(3) Consumer prices

Consumer prices of rice have followed patterns of seasonal fluctuations too as shown by the series of curves in Figure 9, which shows the average monthly retail price of Macan-2 rice in Manila since 1965. The fluctuations were greatest in 1966 when the HYVs were being introduced. In 1967, the fluctuation was less, ranging from 1.50 Pesos per ganta (2.24 kilograms) to 1.70 Pesos per ganta, a change of 20%. A striking thing is the unusual stabilization achieved in 1968, ranging from 1.50 to 1.58 Pesos during March and April, a change of 5.3 per cent. This expresses very clearly the situation on the supply side. 73/

The consumer's price had been increasing more rapidly than most consumer goods since 1960. The consumer's price index excluding rice, rose from 109.6 in January 1960 to 142.7 in January 1966; to 150.4 in 1967; and to 154.4 in June 1968. The consumer's rice price index rose from: 97.2 in 1960; to 166.8 in 1966; to 210.7 in 1967; and dropped to 189.8 in June1968. 74/ Thus the supply was adequate to influence the cost of living downward, and levelling off in 1968.

73/ Bureau of Commerce and RCA Fieldmen. There are 25 gantas of milled rice in a cavan of 56 kilograms. See Fig. 9.

74/ See Table XXIV, Appendix; Op. cit., Weitz-Hettelsater from unpublished papers of Leon Mears, School of Agriculture, University of the Philippines; Table XXIV-A for period Sept. 1966 to June 1968 were furnished by Leon Mears.

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U.S.A.I.D. figures, which has a base line of 1965 at 100, show that the index rose to 110 in 1966, and to 118 in 1967, but dropped in 1968 and became fairly stabilized at between 110-115. The supply of rice was the primary contributing factor. 75/

From the above, it appears that through the operation of a free market, the introduction of new technology of farming had brought improved efficiency to farming which was being passed on to consumers to some extent, as it should be.

The Philippines had reached self-sufficiency at the current level of population by the new rice program by the end of 1967 and remained in this position through 1968 into 1969. While there was and remains considerable speculation about the amount of rice stored in warehouses, the prices clearly indicated that demand had been met with adequate stocks on hand to keep the price stabilized. This had been done while population was increasing at the rate of 3 per cent plus per year. Population had increased from 32,345,000 in 1965 to 37,158,000 in 1969. 76/

As for actual consumption, there were no measurements available since a census in 1960. These census figures are still being used to calculate consumption on the basis of disappearance of stocks, using the 1960 figures on stocks. Depending on factors used in computation, there doesn't appear to have been much change in per capita consumption, which is probably true, despite increases in income and lower prices of rice, indicating low elasticities.

75/ See Table XXV. USAID Mission, Philippines.

76/ Bureau of Statistics, GOP.

Randolph Barker at IRRI, using a model developed by Mahar Mangahas at the University of the Philippines, School of Economics, estimated the price and income elasticities of damand among rural households. He calculated the income of elasticity of demand to be almost zero and negative, and theprice elasticity of demand to be low and negative, - 0.35.

The income elasticity of demand estimate would indicate that consumption would not increase with an increase in income. The price elasticity figure would indicate that price would have some effect on consumption. While these estimates appear to be in the right direction, and are the best figures available, there is a good deal to be desired in the statistics on which they are based, especially, the amount of rice in storage. 77/

As stated, the storage figures used does not take into consideration any changes in production, consumption, or inventories, since the last census in 1960. Casual observations during 1967 and 1968 show that there was more rice in storage than in previous years in rural areas where paddy (palay) rice is purchased. This is indicated by increases in RCA and selected warehouse inventories, (Figures 7C and 7E). Also, unofficial and unpublished, advanced information from a survey made by one of the agencies of the government shows that rice stocks in rural and urban households may have increased by 1968 by as much as 3 million cavans of clean rice. This is equivalent to 130,000 M.T. The figure does not include rice for seed or rice in any commercial establishment. This would indicate that households, both rural and urban, are responding to price of rice for speculation or for investment

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77/ Op. cit., IRRI - Barker, 1968

for future consumption as a hedge against inflation. Considering the previous plight of subsistence farmers, they may be eating more on farms adopting new varieties than previously, a possibility pointed out by Barker in his elasticity calculations and by the sample survey of stocks by the PAC. It was generally felt that people are eating more rice than the 82 kgs. per capita per year calculated by Golay in his studies. 77a/ Consumption above 92 kgs. per person in urban areas and around 120 in rural areas is reported to have been observed in a nutrition study being conducted by the University of the Philippines in 1968. 77b/

4. Government Policies and Price Stabilization Program

Many factors have contributed to the important increase in production achieved thus far. Development and spread of the new varieties has already been described. The role of the private sector was described in the fertilizer, credit and seed program. The research, demonstration, pilot tests, and initial farm results generated an interest and enthusiasm within the Philippine Government and sparked the program and resulted in favorable policy and improvement in operations. Training of agricultural workers has been increased. Important in the policy area was the price stabilization program, and other policy measures taken by the Government which contributed to the success of the program, particularly to the initial success, which

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77a/ op. cit., Golay.

77b/ No publication is available yet on these studies said to have been made during one week in 1968. See Chart Figure 7-8 which shows patterns of rice warehousing 1966,1967, and 1968. Months shown for 1968 show increased stocks - RCA.

generated a momentum that helped carry the program forward.

Toward the end of the Macapagal administration, the AID Mission with GOP cooperation, inaugurated an experimental pilot program of rural development in two provinces, Laguna and Tarlac, selected because of their importance as rice producing areas and their progressive and active governors. The program focused on a pilot municipality (county) in each province, and was structured on a program of increased production by farmers, self-support rather than give-aways, and maximum involvement of private enterprise, local governments and civic leaders. Emphasis was placed on improving the capability of local governments to maintain facilities such as roads and irrigation works and other public services. These included tax mapping, land classification, expanding and improving technical services to small farmers, and making available supervised credit from privately owned rural banks under a guaranty arrangement with the Central Bank of the Philippines. AID's dollar role in this pilot program was one of technical advice in key aspects, and commodity support, such as construction equipment from U.S. excess property. PL 480-generated Pesos were used to underwrite the supervised credit extended by the rural banks in the project areas.

Impressive gains in rice productivity in these municipalities were attained through the combined action of all these essential ingredients. The success of the effort and the experience gained was an important factor in President Marcos' 1966 decision to adopt as a major goal of his administration a rice and corn self-sufficiency program; one that was initially focused on twelve priority provinces having the greatest rice production

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potential. The program which had been developed and demonstrated in the two pilot provinces became in large part the model for the twelve-province effort.

To manage this program, President Marcos established a Rice and Corn Production Coordinating Council (RCPCC), composed of officials from the various agencies involved in providing services to farmers. With the vigorous, top-level involvement of the Marcos Administration, the program moved ahead rapidly. Less than two years later, through the combined efforts of the agencies comprising the RCPCC, assisted by a small group of AID advisers, and with the active cooperation of the private sector and IRRI, a record rice crop was harvested and the goal of self-sufficiency was reached.

Rice price policy which affects both producers and consumers is of critical importance to the Philippines. This is particularly true because of the importance to and the important role that rice plays in its economy. The policy is inevitably influenced by the international market situation and by policies of rice importing and exporting countries of Asia, and the rest of the world, particularly U.S. production, exports, and subsidy policies. Establishing appropriate rice price policy objectives, and operating a pricing program require knowledge of supply-responce behavior, and changes in demand due to changes in price and income, and above all, accurate statistics on crop production and supplies in storage. These are inadequate in the Philippines. In this area, there is a lack of appreciation for accurate statistics and for the function of supply and demand on prices among some high policy makers.

The Government policy toward rice has been to maintain low retail prices and fair farm prices. Its previous policy (before 1966) had been to subsidize the consumer prices through absorption by Government of price differentials on imported rice.[77c/] The Philippine Rice and Corn Administration is the Agency responsible for carrying Government policy on rice. The RCA has the responsibility to:

(1) maintain low retail prices,

(2) maintain "fair" farm prices,

(3) break even on its buying and selling operations,

(4) minimize rice imports,

(5) reduce within-year and between-year price fluctuations,

(6) facilitate the "nationalization" of grain marketing,

(7) supply consumers with rice of various qualities, and

(8) encourage rice and corn dealers to improve the efficiency of the grain marketing system.

The relative importance of these goals has changed from time to time, but the first four have generally been the most important and the most troublesome. They are likely to remain important because rice is a mainstay in the Philippine diet. They are also likely to remain troublesome because some of these goals are in conflict. Already, there is conflict and debate about the quantity of rice in storage; whether and how much rice RCA should sell domestically and at what price, and whether or not self-sufficiency has been, indeed, reached; and, therefore, how much should be exported, if any. There is a basic conflict in the policy to break even in a government operation in the rice industry and the policy to use its

77c/ See Figure 7F, which shows designed program - RCA

stocks to stabilize prices (buying high and selling higher); functioning as it is supposed to do on the basis of "surpluses", the opposite policy of buying high and selling lower, or subsidization, would be indicated when there is a need to do so (abnormal surpluses).

The RCA has pursued a policy of attempting to balance producer prices at incentive levels with consumer prices at appropriate demand levels. In order to do this, RCA has maintained a revolving fund with which to purchase that portion of theproduction which was considered surplus to normal market demands. By temporarily absorbing this surplus, it was felt that the price could be stabilized at the support level of 16 Pesos per cavan. The plan of operation is to hold the rice for a period until the supply decreases and demand rises, at which time it is sold by the Government (see Figure 7-G).

The Price Support Law, enacted in March 1966, increased the price of palay from ₱12 to ₱16 a cavan. This marked a change in orientation of Government toward the producers and away from consumers in pricing. According to the RCA, this law was effectively implemented so that the average price of palay increased from ₱13.40 in 1965 to ₱17.40 in 1966, and ₱18.00 a cavan in 1967. These prices, as mentioned earlier, did provide the needed initial incentive for farmers. RCA estimates that the increase of farm income in 1966 over 1965, as a result of the Government's price alone, amounted to ₱210 million, and that farm incomes in 1967 increased ₱53 million as a result of increased production.

A new Chairman was appointed to head the Rice and Corn Administration in 1966. The RCA had been operating at a deficit incurred by selling rice at less than cost to the consuming public, and excessive operational expense. The accumulated deficit amounted to over P100 million at that time. The RCA is a service and support function and will probably never operate at breakeven but the introduction of better management and business practices have drastically reduced the rate at which losses occur. 77d/

RCA's role as coordinating agency and promoter of increasing production had worked well during the time of a deficit domestic supply but faced a dilemma in the support program when domestic supply overtook demand. It borrows its revolving fund for stabilization at the Philippine National Bank and pays 7% interest. Its policy of operation requires that rice be purchased at the fixed limit of 16 Pesos per cavan when prices decline in order to bring them back in line. A goal of about 10% of annually market rice had been set to achieve this goal, (see Figure 7-D). However, RCA bought rice in 1967, filled its quota, waited to sell at the same level or higher (not to lose money), but the market price continued to decline into 1968 when RCA had 17,850,000 Pesos, and had purchased 10.5 million cavans (467,000 M.T.). 77e/

77d/ See Figure 7-H - RCA Releases.

77e/ See Figure 7e and 7G, which show cumulative sales, RCA, and RCA financial position, respectively.

77f/ RCA has encouraged improvements in grading for moisture content (use of meters), and in use of drying equipment and standardization of quality of rice. "Some Current Issues in the Marketing of Rice and Secondary Crops in the Philippines", an unpublished paper by Dr. G. P. Summers, USAID-Philippines, dated January 13, 1969.

With increased production, and no noticeable significant change in demand, no opportunity presented itself for RCA to sell any significant quantity on the domestic market. It was able to export only 42,000 M. T. Without funds to purchase any significant quantities after early 1968, and unable to sell without a loss, RCA sat tight. Politically, it was more palatable to say that it had been out of money to purchase rice than it was to sell at a loss, which it could not do by law, anyway. Herein lies the conflict in Government policy.

The Government is faced with the difficult decision of whether and to what extent it can afford to subsidize the price of rice to farmers in order to maintain a degree of stability to rice prices during abnormal seasonal surpluses. To operate RCA as a business for breaking even in the rice business under current legislative restrictions creates a conflict. If it operates in price competition with rice dealers, it could possibly break even. However, in this respect, there would be obvious limits of the length of time it would maintain buffer stocks, as it would have to buy and sell at opportune times. If RCA is to perform a function in price stabilization, the Government must be prepared to absorb some of the losses incurred in maintaining buffer stocks. Conceivably, it might be necessary to maintain a buffer stock for a year or two. While some observers feel that it would be physically possible to do so with losses of no more than one per cent per year, the cost of storage would incur a business loss. Weitz-Hettelsater estimated that rice must be turned over three times per year in order for the warehouse to make a profit.[78]

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78 Op. Cit. , Weitz-Hettelsater Report

The Government would be in no position to subsidize the farm price of rice indefinitely and at prices above the international market price. Farm efficiency in the Philippines must absorb the cost in the final analysis. It is felt by observers now that the current level of farm prices of about 13 to 14 Pesos per cavan is a correct and adequate price for farmers under current conditions. However, if these prices are favorable for use of HYV and new technology, as it appears, more farmers will adopt the new technology as irrigation land is expanded and probably create, from time to time, temporarily, abnormal seasonal surpluses. This will be where Government intervention will be needed to stabilize the situation. In a normal situation of supply and demand, no intervention appears needed from the experience of 1968.

There are many implications in a policy of price support or stabilization in the Philippines that need careful study and clear understanding by policy makers of government.

In other areas, the Government has been moving toward greater participation by theprivate sector. Rice export appears to be one of these.

The policy on exporting is clearly not determined yet. The Government originally had a goal to produce for export, but ran into difficulty in quality and a poor international market when the opportunity arose in 1968. Then there was the larger issue of whether the country had adequate stocks to export. The international market has changed during the past two years, and prospects are not good for the near future, with many countries increasing production with new varieties, including wheat and corn, both competitive grains to rice. Even Japan, a traditional importer, exported rice for the first time in 1968.

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In the long run, the Government has the responsibility to project and plan the development and use of its resources to meet requirements for the future. Despite successes and an outlook for possible temporary surpluses, self-sufficiency in domestic production could be very ephemeral with the current rate of increase in population if farm prices should drop very low. The country must be prepared to feed an ever increasing population. The resources appear adequate for many years for this purpose, if rationally used. Farmers need help in the development of resources, in education in their use, and will undoubtedly need some cushioning help from government from time to time in the area of prices and marketing. The area of processing and storage, covered later, requires pioneering capitalization by government. The private sector has been reluctant to invest in this area because of risks, uncertainty in the market, and uncertainty in government policy toward rice.

The Government needs to revamp, consolidate, and improve its crop reporting and forecasting system and to train people in order to obtain timely and reliable statistics for planning use of its resources and a price support program, as well as to regulate its import and export program effectively and orderly. A system based on scientific, statistical sampling, free from the administrative bias inherent in the present system, is necessary for the Government to chart its appropriate course for the entire program of production, marketing and consumption. As noted from production information in this report, estimates vary greatly depending on the reporting agency, and the variation is too great for rational planning. Understandably, those responsible for production programs have a bias for over-reporting.

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The problem of pricing and marketing in the Philippines can extend to the international scene; a possibility that already is creating concern among some authorities. The implications for markets for U.S. commodities and the PL 480 program are ominous, as are some of AID's programs which are based on surplus grains. These problems are closely related to stabilization programs here and elsewhere in Asia.

The constraints to an effective price stabilization program in the Philippines are similar to those found in many countries of Asia, as was pointed out by the Asian Development Bank in its report, Asian Agricultural Survey.

Pricing, price supports, their influences on transfer of resources for rice production, the consequences of this, and alternatives open to the country are subjects needing more research and study. Pricing is a critical issue. The Weitz-Hettelsater Report explicitly based its estimates of storage requirements on the assumption that rice prices to farmers would be stabilized at 16 Pesos per cavan. This price now appears to be high by 2 to 3 Pesos, but the Philippine market is relatively small and sensitive. Government action may be needed from time to time to remove some of the sensitivity.

5. **Marketing - Storage - Processing**

The introduction of the HYV has created problems in drying, processing, and storage on the farm and in commercial channels.

Drying of rice to a moisture content that will permit safe storage and will give a good recovery in milling is a problem which has been aggravated by the HYV. Undried rice spoils in storage. Rice dried too much or incorrectly causes breakage and losses when milled. In the past,

quality, in terms of degree of breakage, was not a factor which influenced buyers' decisions in the Philippines. However, quality becomes important in a domestic market that is becoming discriminatory with increase in income. Quality is essential in an export market.

The traditional method of drying rice has been by natural sun, heat and air. Rice production in thepast coincided with the season of the year -- rainy, or wet, and dry if irrigation were available for a dry season crop. Harvest was timed to fall at the end of the rainy season, for rice planted during this period. For irrigated rice during the dry season, the harvest was timed to fall before the beginning of rains. This permitted natural drying in either case. The HYV of rice, with shorter periods of maturity, which permits two or more crops per year, introduces the problem of drying the rice which is harvested during the rainy season. Natural drying is not possible, or has limited possibilities, during the rainy season. Mechanical or articial drying of paddy rice is necessary for rice harvested during the wet season, and is needed for part of the rice in all seasons in increased production situations. 79a/

Commercial facilities for storing and processing rice had been developed for the traditional system. A completely new system is now required to dry, process, and store the increased production that has taken place and will continue with expansion of population. The survey by Weitz-Hettelsater Engineers, which was done for AID in 1967, determined the extent of the needs in this area, and the costs for construction of new facilities and rehabilitation of old. 79/

79a/ See Figure 10 which shows the comparable distribution of harvests between the new and traditional rice varieties, prepared by the Bureau of Agricultural Economics.

79/ Op. cit., Weitz-Hettelsater.

The survey showed the needs in this area by 1970 to be staggering in terms of costs and trained manpower. By 1970, the country will need 99 additional medium and small storage units and eight large silos, scattered throughout the country, with a total increased storage capacity of 203,000 M.T., to satisfactorily handle additional anticipated grain production (rice, corn, pulses, and sorghum) to meet the demands of an increased population. Almost all old facilities must be rennovated. All new facilities must be equipped with drying machinery, and about half of them must be equipped with milling machines. The additional medium and small units, about 75% of the added capacity, will be adequate to store grain only for a minimum period of a few weeks necessary for drying during the harvest period. The silos, about 25% of new capacity, might handle grain for longer periods, although their drying facilities would be needed throughout the rainy season, which would limit the period of storage. However, in the case of rice, the Philippines would need 850,000 M.T. of additional storage space to carry a two months supply for the country, which shows the magnitude of problems and programs for maintaining stocks for buffering for prices and a strategic supply against crop failures. 79b/

Improved modern mills are available and some are being purchased and installed in the Philippines. However, capital invested in current equipment is a deterrent to rapid change. A transitional period is required during which present installations will need to be rehabilitated and improved while new installations are being introduced.

79/ b. Ibid.

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Imported dryers, if imported complete, are priced in the neighborhood of 50,000 Pesos or $12,500, which is more than the average rice miller can afford. Also, some of the dryers imported to date have not been designed for rice and have not been satisfactory. As a result, many local inventors have produced dryers designed to satisfy conditions and requirements unique to the average rice mill or warehouse of this country. Some of these drying devices appear to be very promising. USAID is supporting the development and testing of some models.

The GOP is presently engaged in the preparation of documents necessary for pursuing a loan from the IBRD for the implementation of the recommendations contained in the Weitz-Hettelsater report for the first phase (to 1975). Meetings with Bank and GOP officials are scheduled early in March 1969 to secure funds for the first phase of this program which is estimated to cost about 15 million U.S. Dollars. The entire program calls for the installation of 108 satellite facilities each with storage capacity of approximately 1500 metric tons. These are to be located within areas of high production. In addition, facilities will be constructed at collection centers and at ports throughout the Philippines as follows:

3 units	of 3,000	MT capacity	each
13 "	" 5,000	"	"
7 "	" 10,000	"	"
1 unit	" 15,000	"	"
3 units	" 25,000	"	"

It is estimated that this entire expansion program will cost over $67,000,000 and is scheduled for completion by 1975.

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During 1968, the GOP negotiated with an American company for the purchase of 20 storage units which will handle 1,400 MT each. Some of these units are being installed now under lease arrangements with FaCoMas and private companies.

Financing costs of construction of the facilities, and the training of management and technicians to operate the facilities are major problems facing the GOP. These and other problems make the task of developing a successful rice stabilization and marketing program a monumental one; roads, transportation, crop reporting, and forecasting programs, and others already described. Together with these problems are those of rational uses of resources made available by the improvements in rice technology: research to improve efficiency of secondary crops for food and livestock feed; market development; and introduction of processing for increasing export of agricultural commodities.

SECTION 9

E. Government Programs - Institutions

1. Institutions

Many factors have contributed to the rice production program thus far, as have already been described. If we had to select the most important, it would be research. Without this, there would have been no program. That IRRI lead the way is well understood. However, there were a number of other factors, all interrelated, that made the program possible.

While the interrelationship of these factors must be stressed (particularly in efforts to recreate the Philippine successes in other countries), it must also be remembered that many of the inputs and institutions which helped the farmers increase their yields had existed, or were being developed for a number of years. For example, the International Rice Research Institute (which developed IR-8, the pioneer high-yielding variety) had been cross breeding and experimenting with new grains since it began operations in 1962; the fertilizer companies have had operations, though on a less extensive scale, in the Philippines for a number of years; and the rural banks and extension services date back to the early post-World War II years. Many of the GOP agencies which were coordinated under the Rice and Corn Production Coordinating Council (RCPCC) have existed for many years. Essentially, the vital element was the coordinating and galvanizing of these institutions into more effective action, and the making of the new inputs available to the farmer. Also, initial production increases tended to have a multiplier effect, as they gave the farmer new incentive and resources to make better use of his land.

It was important that the government and private industry had developed institutions that were able to move in, with some coordination and assistance from AID and IRRI, to take advantage of the opportunities that had been offered by research.

Before he would be willing or able to make the transition from traditional rice varieties, the farmer had to be given the opportunity to try the new HYV seeds on a small scale; and he had to have the means of financing the inputs required for the new varieties.

During 1966, the A.I.D. Mission designed a "do-it-yourself rice kit" containing all the agricultural supplies needed for the scientific cultivation of IR-8 on 2,000 square meters (one-fifth hectare) of land. Included in the kits were IR-8 seed, insecticides for stemborer and leafhopper control, urea fertilizer, rat poison, and an instruction booklet printed in the farmer's dialect. USAID financed the first 100 kits in December 1966. Since then, over 22,000 kits in one form or another have been distributed throughout the Philippines. These kits enabled the Filipino farmer to make the transition to IR-8 initially on a small scale, thereby minimizing the risks of innovation. The kits also provided a means by which agricultural extension technicians could teach farmers modern rice culture practices. In the season following the original distribution of the kits, the area planted to IR-8 by farmers who had previously used the kits increased tenfold.

The first rice kits were sent to Pampanga, one of the 12 Priority Provinces, and were made available to farmers through the rural banks. The farmers promised to pay the '70 cost of the kit from the proceeds of

their harvests. It was important that the farmers not consider the kit as a gift, but that they learn the cost/benefit relationship of planting IR-8. Additional kits were sent to other provinces and sample kits and display boards were provided to GOP agencies, private companies, voluntary organizations, and leading national newspapers. President Marcos showed great interest in the kit idea and asked that displays be made available in all the major rice producing areas.

More than half of the kits distributed were sold through the private distribution networks of two private fertilizer companies, Atlas and ESSO. By late 1967, the ESSO Fertilizer and Agricultural Chemical Company had sold over 8,000 kits, each for 2,000 square meter plots, through some 400 ESSO Agro Service stores, and the Atlas Fertilizer Company over 5,000 kits (for 1,000 square meter plots) through their country-wide chain of distributors. Later kits were also distributed by Philippine Government Agencies, including the RCPCC, the Agricultural Productivity Commission and the Bureau of Plant Industry. By the summer of 1967, the GOP Presidential Arm on Community Development had distributed more than 5,000 kits. Following a disastrous flood in 1967, the U.S. Ambassador purchased 300 kits from his contingency funds and donated them to Sorsogon Province. Programs based on the rice kits were also adopted by the Development Bank of the Philippines and the Philippine National Bank.

Voluntary organizations also played an important role in distributing the kits. In February 1967, the National 4-H Club of the Philippines requested USAID's assistance to prepare 500 IR-8 rice kits designed to cultivate a tenth of a hectare for distribution to 4-H members throughout the country. Seeds

and instruction booklets were donated by USAID, insecticide by the Union Carbide Company of the Philippines, and fertilizer by the Atlas Fertilizer Company. The kits sold for ₱40 and were paid for after harvesting. During the first half of FY 1968, the USAID Mission Director utilized his Special Development Activity Authority to provide the 4-H Clubs with an additional 500 kits. A similar program was undertaken by the Future Farmers of the Philippines.

An important component of the RCPCC's Rice and Corn Self-Sufficiency Program has been an increase in technical assistance to the farmers. For optimum results from the new varieties, proper cultivation techniques must be employed. The experience of Filipino rice farmers with modern methods of cultivation has made them more receptive to advice on the scientific cultivation of other crops. Now it is quite common to see rice followed by mungbeans, cowpeas or corn or sorghum in the dry season. Field demonstrations and local organization and coordination techniques successfully developed and used in the Tarlac and Laguna pilot efforts were adopted by the National Rice and Corn Self-Sufficiency Program. Technicians have been working directly with the farmers in the field and have relied on private credit institutions and dealers of pesticides, machinery, and fertilizers for necessary support. Much of this project's success is accredited to the good rapport developed between the private Agro-chemical Companies, the agricultural field technicians and farmer-producers.

In each Priority Province, there is an agriculture production team composed of employees of the various government agencies represented in the RCPCC. The RCPCC reports that some 285,000 farmers are served by these

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field technicians. Most of the technicians have had some earlier training and/or experience in improved methods of rice cultivation; however, additional training is being provided to increase their knowledge and to keep them current with new developments. In March 1967, an agreement was negotiated between the UPCA (University of the Philippines College of Agriculture) and the RCPCC to provide an intensive four-week training course in the proper cultivation of the new rice varieties. Two hundred selected agricultural technicians have attended this course and are presently serving in the Twelve Priority I Provinces.

In April 1967, a joint USAID/NEC/RCPCC program was drawn up to provide a series of one-week intensive training courses in rice culture for technicians and farmers in the twelve Priority I Provinces. By the spring of 1968, 806 production technicians and 206 farmers in the Priority Area I, as well as 143 technicians and 50 farmers in Priority Area II had completed this training. During CY 1967 and the first half of CY 1968, nearly 1,600 technicians received training in advanced rice culture.

A.I.D.'s Rural Development Advisers spend (and continue to spend) a large part of their time in the field, working with the farmers and their Filipino counterparts. During the past two years, A.I.D.'s field efforts have been concentrated largely on rice production. There are full-time provincial agricultural advisers in five provinces, and others devoting their time to several provinces. The main function of USAID's provincial development activities are to work with the provincial governors and their staffs to improve local development planning and implementation. A Peace Corps group of elementary school teachers which arrived in the Philippines in June 1968 received

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training in rice production so as to be able to help introduce the new production methods through their assistance.

Training of technicians in this field has also been conducted by IRRI, although its primary function is research. In 1968 A.I.D. provided a $400,000 grant to IRRI to help expand its training services to the Far East, South Asia, Africa and Latin America. IRRI's training programs are adapted to the differing needs of professional agriculturists, research scientists, extension workers, and BS and MS candidates in cooperation with the University of the Philippines College of Agriculture.

IRRI's original group of about 35 trained extension agents became prime movers and "change agents" in all the areas. Some of them worked for the government and others for ESSO in its fertilizer program. In its approach to training, IRRI sought and achieved a change of attitude. The agents brought in for training were college graduates working in extension activities. Typical of such agents in developing countries of Asia, they had the academic credentials of an agricultural education but knew little about practical rice farming, and less about the rice plant itself. Many did not communicate with farmers and were not interested in their problems.

The course was 6 months. It consisted of field and laboratory work. Agents in their bare feet worked in rice paddies behind a carabao — cultivated, harvested, and threshed rice. In the laboratory they learned to identify rice diseases and their treatment. When these men finished, they not only knew rice and its cultivation, they had become enthusiastic, dedicated missionaries of rice cultivation. Their services were sought by private industry and various agencies of the Government. In the field they

assisted as leaders establishing test-demonstration stations, and serving as teachers for other trainees and for farmers.

2. Assessment of Capabilities in Research, Training and Extension

The Philippines is well endowed with institutions both for crop production research and for training of agricultural extension agents. The quality of its extension service, however, needs to be improved.

(a) Research

Three strong institutions are now undertaking crop production research. These are: (1) the International Rice Research Institute with an outstanding and perhaps unique cadre of international rice scientists supported by the Rockefeller and Ford Foundations and in FY 1969 with $400,000 AID funds; (2) the Bureau of Plant Industry, an outgrowth of an agency instigated by the USDA under the American administration of the Philippines; and (3) the University of the Philippines' College of Agriculture, where the research program has benefitted from an association with Cornell University since before the Second World War, first as a University contract, since the early 60's under AID and now, under the Ford Foundation. At all three institutions, there are large numbers of superior plant scientists with advanced training in the U.S. and abroad. Many hold Ph.D. degrees in the various plant science disciplines.

At IRRI, research facilities are ultra modern. At both the BPI and the UPCA, however, the potential for research development would be increased if their budgets were not so heavily weighted on the side of salaries, particularly, those of minor staff, seriously limiting the funds available for operational and program costs.

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(b) Agricultural Education

Some 14 universities provide college degrees in agriculture. In addition, there are numerous so-called agricultural colleges which give vocational degrees in farming. Only one university, the UPCA, turns out graduates with academic training which is on the level of that obtained in agriculture at a U.S. land grant college . More than half of the UPCA faculty have been trained abroad and there are over 75 faculty members with Ph.D.'s. The quality of training provided graduates of most other colleges may realistically be compared to an agricultural certificate obtained at a U.S. junior college.

(c) Extension

One of the weaker links in the chain of agricultural institutions is the Agricultural Production Commission (APC), the GOP's agency for agricultural extension. Largely for political reasons, this agency was split off from the Department of Agriculture and Natural Resources and the BPI in 1964 and put under the Office of the President. The level of technical competence of the new agency is lower than that of the BPI. The APC has difficulty in recruiting new personnel of the desired quality, as the BPI and the UPCA are able to compete with superior salary scales. Some success in upgrading the skills of APC technicians has been achieved through in-service training. A lack of vehicles limits mobility, and poor administrative and logistic support further hinder the technicians' ability to function properly as extension agents.

DI2

Another agency which also works with farmers is the Presidential Arm for Community Development (PACD). PACD workers generally do not have such agricultural training but assist in organizing farmers for barrio level cooperation on matters related to agricultural production and support.

Rural Banks

Rural Banks deserve special mention in a discussion of Philippine institutions. As was pointed out in the credit section, the Rural Banks proved their worthiness to A.I.D. in the pilot provinces of Laguna and Tarlac where a loan of P125,000 ($31,250) in each Province was made to Rural Banks. These loans were re-lent to farmers. Trained agricultural technicians from the Central Bank assisted farmer borrowers. The successful administration of over one million Pesos to rice farmers under this program, with near perfect collection records, convinced A.I.D., Government officials and others of the worthiness of this system. Use of these private banks was part of U.S.A.I.D.'s effort to enlist greater use by Government of the private sector.

Rural Banks in the Philippines had their origin with U.S. assistance, and they had enjoyed a long history of assistance before their use in the pilot projects in 1965 and 1966.

Rural Banks were authorized under the Rural Banks Act of June 6, 1952 during the regime of the late President Elpidio Quirino.[1] This legislation

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79c/ "The Rural Banking System of the Philippines", an unpublished paper by Robert L. Fowler, dated April 8, 1968.

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was based on the experience of more than forty years' effort by the Government to establish an institution that would provide a workable solution to the age-old credit problem of the small farmers, small merchants, and private entrepreneurs. Money lenders and landlords have been traditionally the principal source of capital available to the Filipino farmers. But their high interest rates have served as deterrents to borrowing and capital investment in agricultural improvement. However, it was not the intent of the legislation to replace the money lenders but to involve them in the system under controlled and supervised conditions.

U.S. assistance to Rural Banks was an outgrowth of a request of the President of the Philippine Republic to President Truman in 1950, which resulted in a survey by a U.S. Economic Survey Mission of the economic and financial problems of the country. Among the Mission's recommendations was one to establish small rural banks in strategic locations accessible to more important agricultural regions. The Mission also gave attention to interest rates, saying that they should be moderate and equivalent to that of commercial banks. The Mission further recommended that the banks should provide farmers with a management service. The last recommendation of the Mission was finally implemented some 18 to 19 years later. However, shortly after enactment of the legislation in 1952, the first rural bank opened its doors for business in the town of Pasiz, Rizal Province.

Rural banks are private institutions. The initiative to organize a bank comes from private Filipino citizens, usually a family (not less than five or more than 15 persons) who petition the Central Bank of the Philippines for the necessary authorization to form a stock corporation. The application is screened by the Central Bank for competency of management and suitability of location to serve agricultural needs of the area.

When a rural bank is authorized, it is granted a charter for fifty years. However, the Central Bank can revoke a charter for certain causes. Upon authorization, management issues common stock to private investors to raise needed capital. If private subscription fails to raise the necessary paid-in-working capital, the Rural Bank may raise additional capital through the sale of non-voting preferred stocks to the Development Bank of the Philippines (DBP) in an amount not to exceed the fully paid subscribed capital of the private shareholders. Government subscription is on a matching basis. The preferred stock is paid off as soon as possible from the profits. Par value of common and preferred shares of stock ranges between one Peso and 100 Pesos ($0.26 and $26.00).

Rural banks have another means of raising finances. The DBP and the Philippine National Bank may make loans to rural banks at two per cent per annum repayable in ten years against securities offered by stockholders of the bank. In cases of emergency, the Central Bank may extend a loan to any Rural Bank against any asset considered acceptable by the Central Bank. Rural Banks in good standing may increase their loan funds through rediscounting with the Central Bank of eligible papers covering loans to borrowers at preferred rates from two to three per cent per annum. The Central Bank permits discounting when banks find it necessary to adjust their asset position to meet credit requirements beyond their financial limitations.

The affairs of a Bank are governed by a Board of Directors (5-11) who must be Filipino citizens. Sixty percent of the voting stock must be owned by Filipino citizens, and each Director must own one share of stock. Officers and salaried employees of the Government are not eligible to hold office but may subscribe to stock.

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The minimum paid-up capital required for a rural bank is 50,000 Pesos ($12,800). There are no limits on the maximum amount of capital that may be invested in a rural bank, but the amount must be approved by that Central Bank. The average rural bank has a total capitalization of about 270,000 Pesos ($69,000). A bank's staff consists of a President, Vice President, manager, secretary, and cashier. In as much as rural banks are usually family-owned, small businesses, shareholders serve as officers of the bank and members of the Board of Directors.

The Central Bank of the Philippines is charged by the Government of the Philippines with the authority and responsibility to administer and supervise the activities of rural banks. At least once a year, it reviews the lending policies and operational affairs of each rural bank.

Banks enjoy certain privileges under the Act. Tax exemption (to banks with capitalization from private sources below one million Pesos ($256 thousand)), free technical assistance, credit supervisory assistance, and some commodity assistance are among the privileges. The Central Bank also offers special training programs for management. It also sends 2 training officers to work with newly established banks for short periods. Banks are under a uniform accounting system. This feature has resulted in few suspensions for unsound banking practices or irregularities. Loan guides are laid down by the Central Bank. These include tailoring loans to needs of borrowers, supervision of use, and repayment procedures.

Since the enactment of Rural Bank legislation, the number of rural banks has steadily increased. By the end of 1968, there were 338 banks in operation with total resources of 323 million Pesos ($82.6 million).

Since 1953 loans have aggregrated 1.9 billion Pesos ($38[illegible] million). Approximately 79 per cent of the loans granted during this period (more than 2.1 million loans) went to small farmers, 16 per cent to small merchants, and 4 per cent to operators of small industries. In 1966, the total loans granted small farmers amounted to 267.5 million Pesos ($63.3 million), which was 84 per cent of all loans granted. These were made to 315,595 farmers. The majority of the loans granted were between 100-1,000 Pesos ($26 to $256) each. The interest rate is one per cent per month, or 12 per cent per annum. Loans were extended for production of rice, corn, other crops, and fruits and vegetables.

From 1966, Rural Banks have benefitted from loans and measures of assistance from the IBRD, RCA of the Philippine Government and the A.I.D.-Central Bank-Agricultural-Guarantee-Loan-Fund described elsewhere. IBRD's loan of $5.0 million went through the Central Bank to the Rural Banks for loans to farmers for agricultural machinery. RCA's agreement provides an account in participating rural banks for the payment to farmers for purchase of rice and corn by Government-contracting warehouses under the price stabilization program. Approximately 115.6 million Pesos ($2[illegible].6 million) has gone to rural banks and farmers under this program since the inception of the program in 1966. Central Bank's Agricultural Guarantee Loan Fund, in which U.S.A.I.D. participated, permits loans to small farmers which guaranteed up to 70%. As of April 1, 1968, there were 174 rural banks participating in the program. However, by February 1969, 192 banks had participated in the program.

"Supervised" agricultural credit has been one of the most important features of the credit program in the rice production campaign, and was a key element in the success of the rice production program. Agricultural technicians were furnished rural banks by the Central Bank, as provided by Law and paid by Government. In addition, technicians were made available through an umbrella agreement in 1968 by the Central Bank with selected Government agencies, including the Agricultural Productivity Commission and the Bureau of Plant Industry. Field employees of these agencies were authorized to work closely with banks in their supervised credit program.

Supervised credit, which provided technology along with credit, has been an important feature of the rural banks' activities in the HYV rice program. This type of credit has been by far the most effective. While there are no actual figures on the number of farmers adopting the HYV rice who received credit under the program, something of the magnitude of the number can be appreciated from the data on the total loan program quoted above.

First of all, farmers did not adopt the HYV without credit from some source to purchase inputs. Institutional credit, where available, was provided by the rural banks and the ACA through FACOMAS. Of these two types of credit, rural banks probably provided more than 80% of institutional credit to HYV rice farmers. As noted above, credit under the AGLF was required to go to small farmers, most of whom were rice farmers. The 315,595 small farmers who received credit in 1966 were cultivators of rice and other crops. Although there is no breakdown on the number of these farmers who received credit for HYV rice, we can estimate that about 41,000 farmers would have needed credit in 1966 to plant the 82,000 hectares of HYV rice. This is based on an average farm size of 2 hectares per farm. Actually, the

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average size is smaller than this, probably closer to 1.5 hectares. Of course, not all of these received credit from rural banks in 1966. Probably 70% of them did, and 30% from ACA, and the balance of 10% from other sources.

Similiarly, one can estimate that about 176,000 farmers would have needed credit for HYV rice to have planted the 352,000 hectares of HYV rice in 1967-68. Using the same percentages, one could estimate that the rural banks provided credit to about 123,000 HYV rice farmers for the 1967-68 crop. Using the 800 Pesos figure as an average loan (Mexico Rural Bank average for one rice crop per farmer), the rural banks would have provided approximately 98 million Pesos to HYV rice farmers during this crop year. The reader is cautioned that these figures are rough estimates and are not actual.

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SECTION 20

B. WEATHER

The relation between rice production and weather and the importance of scheduling agronomic sequences to conform with rain cycles has been discussed in several of the other sections of this paper. The difficulties encountered in storage, drying and handling are also directly related to weather conditions. This also is discussed in other sections of this paper; therefore, discussion in this section shall be confined to a brief description of the climate and physical features of the Philippines.

There are over 7,000 islands with a land area of 114,830 square miles in the Republic of the Philippines. Mountains and rugged terrain occupy most of this land area. The agricultural land is generally found in river valleys, coastal plains, plateaus and upland plains. It has been estimated that there are approximately eight (8) million hectares of arable land, of which three (3) million hectares are devoted to rice production.

Rainfall usually occurs during one period of the year, thus dividing the year into a wet season and a dry season. The degree of wetness and dryness, however, varies greatly throughout the islands and even within areas on the larger islands. In the heavy rice producing areas of Central Luzon, the dry months are November through April. The rest of the year is rainy, with peak rainfall in July, August and September. In Northern Luzon (Cagayan Valley) and part of the Bicol and Western Visayas, the wet and dry seasons are less pronounced and the peak rainfall is in September, October, and

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November, but, rainfall is usually more evenly distributed throughout the year. The average annual rainfall for the Philippines is about 100 inches, and in the rice producing regions it is about 90 inches. The Weather Bureau records for 1960 show that the Philippines had an average of 176 rainy days for that year and the average for Central Luzon was slightly less at 167 days.

The entire archipelage, which extends for about 1,000 miles from about 4 degrees North to about 22 degrees North Latitude, is subject to tropical storms and typhoons. The frequency and severity of these storms increase in direct relation to the distance from the equator; thus Central and Northern Luzon are very vulnerable. The storms are characterized by extremely high winds and are accompanied by periods of heavy rain. If these storms occur when the rice is near maturity, the damage by blowing the grain down and shattering the grain can be quite severe. The traditional varieties of rice are particularly susceptible to this lodging because of the height of the plant. Floods due to the accompanying rain are, sometimes, sufficient to overflow levies and reach velocities sufficient to break down dykes and completely destroy rice fields.

With the variation in latitude found in the Philippines, the seasonal photoperiod becomes an important factor in growing crops. Thus, the reduced sensitivity of the HYVs has been an important factor in their rapid introduction and acceptance throughout the Islands. This importance is increased by the number of overcast days (167 to 176 rainy days) which limit the total hours of sunshine per year.

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Temperature variation throughout the Philippines is closely related to altitude so that temperatures in the major rice producing areas are rather

D 13[1]

constant throughout the year. The average temperature in the Philippines is 27 degrees Centrigrade or 80.6 degrees F, and the average annual relative humidity is 82% as recorded in the Weather Bureau Reports for 1960. The lowest relative humidity average occurs during March and April, going down to as low as 65%. Much higher averages are encountered during the rest of the year, with the higher averages in the 80% and 90% occuring in September, October, and November. These months of high relative humidity coincide with the harvest of the HYVs and has been an important factor in the need for and the push for mechanical drying.

The last three years, crop years 66-67, 67-68 and 68-69, can be generally classed as good crop producing years with the exception of a typhoon in 1967 and a drought in 1968-69. In November 1967, Central Luzon suffered an extremely severe typhoon (Welming) which did extensive damage to the rice crop. There were great anticipations that this would be the year that self-sufficiency would be attained. All of the people associated with the rice program were very concerned that this typhoon had shattered their hopes. Upon examining and evaluating the damage it was found that the HYVs had survived much better than the traditional varieties and the increased yield of the HYVs was sufficient to meet the anticipated goal.

The crop year 68-69 has been characterized by a severe drought throughout the Philippines. The rainy season started later than usual and ended abruptly and early. Again there was great concern over anticipated rice production and again it was found that the HYVs, with their shorter growing period had survived and has been harvested before the effect of the drought

D1 3

became real serious. Estimates now indicate that total production will be near that of last year though traditional varieties were severely damaged by the drought.

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II. Assessment of Causes

Most of the factors responsible for the success of the rice production program have been covered. Some of the major ones will be summarized here and a few other thoughts added.

Increased yields of grain possible with the use of fertilizer, assured price level for farmers, and improved net income were reasons that farmers adopted the new varieties. Research science had made the opportunity available to them. The efforts of many institutions and people brought the opportunity to them. Along the way, attitudes of individuals were changed.

Standing out in importance among all the elements are research; pricing policy; the active participation of the private sector in supplying credit and the necessary inputs, seeds, and agro-chemicals; development of irrigation facilities; marketing, and storage, processing, and drying facilities. Pricing policy is closely allied to marketing and storage, and is critical to production, consumption, and stabilization of the economy. In the initial stages, government's policy of stabilization of prices through support activities, enabled by a favorable international price of rice, were important in assuring the high price that provided the kick-off incentive to farmers. Improvement in irrigation facilities and systems and expansion of irrigated land increased the resource potential for the population, during these years. Not to be overlooked was an increased effective demand for rice made possible by a continuation of average percapita incomes despite rapid expansion of the population.

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An official of the GOP assessed the causes very appropriately, after giving "research" its due credit:

(1) elimination of Philippine poli i s from the rice production programs, and giving full responsibility to "technocrats" to run the program; enabling RCA to keep prices to farmers high during the introductory phase, and it and other agencies to carry out other operational policies.

(2) successful coordination of one government agency (RCPCC) of the activities of 22 other agencies involuved in agriculture and rice;

(3) heavy involvement and participation and cooperation of the private sector in seed multiplication, technical assistance to farmers, distribution of farm supplies, and in credit (rural banks);

(4) pilot studies which provided data, information, and methodology and the direction to proceed;

(5) concentration of Government (and private) efforts in the 12 largest rice producing provinces;

(6) use of private farmer-cooperators for demonstrations instead of mass-media extension technique;

(7) favorable government policy toward and encouragement of private enterprise by getting out of fertilizer subsidy program.

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SECTION 12

III. U.S. Role

The importance of the U.S. role in the rice program covers the U.S. efforts in building institutions in the Philippines over the past 20 to 30 years, dating back to the end of World War II. That institutions, such as the rural banks, the U.P. College of Agriculture, Bureau of Plant Industry, the Agricultural Credit Administration and others existed to carry out their programs was due in no small part to the long program of assistance provided by the U.S. Aside from building local institutions, the USAID program has provided special and advanced training in the U.S. and other countries for approximately 1,000 Filipino agricultural specialists. Since 1965, the USAID has been successful in providing the assistance required to enable the GOP to overcome problems involved in coordinating and implementing its agricultural production programs. With USAID assistance, the GOP integrated all national agencies involved in agricultural production under a coordinating body, the Rice and Corn Production Coordinating Council (RCPCC). This body has been very successful in directing the nation's accelerated rice and corn production program.

USAID officials were also able to effectively apply a real influence to the rice production program, in terms of policy. Based largely on preliminary results obtained from pilot efforts, top officials of USAID with full support of the Ambassador and the Country Team, used every persuasive means to convince top GOP officials, including President Marcos, to give top priority to the rice

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self-sufficiency program. This, we believe, influenced the President to assign highly competent and influential personnel to direct the program. The Executive Secretary to the President was named as Executive Director to the RCPCC and, in the early months of the program, he allocated most of his time to this activity. USAID officials, especially the Director and Deputy Director, worked constantly with the Executive Director in order to provide any possible assistance to the Program.

Policy influences of the U.S. through the Ambassador with the "Country Team" backing him, and through the U.S.A.I.D. Mission Director were very important, if not critical, in gaining the full support of President Marcos and his Government to back a new rice program. The U.S. was in a strategic position to exert this influence. Furthermore, rice production had been a priority technical assistance program in agriculture for the U.S. dating back to 1964 and earlier. Therefore, the U.S. Mission sought every means to encourage the Philippine Government to make every effort and to accord to rice a similarly high priority among its programs. The Philippines had been a heavy importer of rice, much of which had been coming from the U.S. under the PL-480 program (75,000 M. T. in 1964 and 1965 and smaller amounts in 1967).

The U.S.A.I.D. strategy was, first, to convince the Government of the critical world food situation and the danger to the Philippines of being a food importer in face of a world shortage; and secondly, to convince the Government that it could improve its domestic food production with existing resources.

The task of convincing the Government of the world food shortage was easy at this particular time. This was the central theme in international and U.S. economic and food literature during 1965, 1966, and 1967. The U.S. was giving the theme particularly heavy play because of the depletion of its surplus commodities. The message was raised to the Presidential level in 1966 by a study by the President's Science Advisory Committee which published the three-volume tome on the World Food Situation in May 1967.

The task was made easier by the fact the U.S. was unable to meet the Philippine request for PL-480 rice in 1966 because of the exhaustion of U.S. surplus stocks; and the U.S. could supply only a modest amount in 1967. Rice was scarce in the world market and prices had risen. Furthermore, rice imports had become a heavy drain on Philippine foreign exchange. In 1965, $65,685,000 had gone for the import of rice.

To drive its message home that the problem in the Philippines was not temporary, but one that would increase with the expanding population, U.S.A.I.D. called in an outstanding scientist well known to the Filipine officials and academicians. Frank H. Golay's study of food and population revealed most dramatically to officials and academicians the magnitude of the problem that lay ahead in the Philippines. The outlook of a national catastrophe by 1985 that could result from food shortages caused by the widened gap in population levels and food supply was a sobering projection. The Philippine Government realized that something had to be done about domestic food production.

While the Government was convinced of the need, it still lacked the confidence that the Philippines possessed the resources in Technology, technicians, and finances to solve its food problem. Officials were thinking of grandiose land and water development schemes requiring large outlays of capital and trained management. There was much skepticism at all levels that the job could be achieved through improved management of existing Government institutions working with small farmers, despite advanced technology in rice varieties taking place at IRRI. Convincing the Government of this possibility was probably U.S.A.I.D.'s greatest achievement in the entire program.

The Mission chose the pilot schemes in Tarlac and Lagume to convince the Government of the possibilities.

In the meantime, U.S.A.I.D., recognizing the inadequacies of old line agencies in credit, extension, and distribution of inputs, sought to influence Government to rely less on Government and more on the private sector for these functions. After all, the Government's credit and extension agencies which had attempted to carry the entire load of training farmers and supplying all the inputs in the past had not changed the rural scene appreciably.

It was important that the Government and A.I.D. recognized Government's more limited but critical roles and decided on an action program that would most effectively use Government resources, and at the same time take full advantage of the private sector.

Through years of technical assistance, a number of Philippine institutions had been developed to serve farmers and rural areas. That they had not changed the rural scene appreciably was not due entirely to the institutions. As we see it now, science had not developed enough technology prior to IRRI's achievements to give the institutions effective tools to deal with peasant rice farmers. It was recognized by the Government and A.I.D. that the best of the limited talented must be pulled together, and given the maximum support to perform Government's key but more limited role. This limited role recognized the essential use of the private sector in seed multiplication and distribution (cooperating farmers working with the Bureau of Plant Industry), agricultural credit (Rural Banks) and fertilizer and other agricultural chemicals (the manufacturers and distributors). Government's role, therefore, was one to train agents and a few leading farmers to use the new technology and inputs and to demonstrate the lessons adequately to masses of farmers in many areas to persuade farmers to try for themselves.

U.S.A.I.D. played an important role in assisting in developing and financing training programs by establishing training programs at the University of the Philippines College of Agriculture which worked closely with IRRI. Extension agents, trained in the U.S. text-book method of experiment-demonstration, lacked the farming ability and practical know-how to deal with peasant farmers. The agents had to learn by wading in rice paddies to cultivate rice in order to pass the lessons on to farmers. This requirement had been overlooked or not understood in past efforts at institution building. The agents were at first as skeptical as top Government officials of possibilities of changing peasant farmers to become successful commercial rice producers with the new technology.

Therefore, while institutions existed, a revitalization throughout was necessary for carrying on a successful program. The training programs at Los Banos and the proving grounds in the two province pilot areas did the job.

The training program changed the views of agents and equipped them to do a new task. The two pilot projects convinced skeptics of the Government that a program could be carried out even with limited resources and trained manpower. Most important, the projects convinced them of the ability and willingness of the farmers to change, once given an incentive and opportunity. Also, the pilot projects gained recognition by the Central Government of important roles of provincial governments in the rice production and agricultural programs.

The job for the Government after the success of the pilot projects was to pull together the best of its limited trained manpower and organizational skills and back them by pooling limited, existing resources, and using these in the most strategic, advantageous, and potentially effective agricultural areas. Its alternative was to back equally all existing agencies to cover equally the entire country, which would have dissipated its best talent and resources. The thinking back of the policy to concentrate and limit its efforts and areas of attack reflects that of the U.S.A.I.D. Mission Director who was personally convinced that this approach was the only one that the Government could possibly support. It reflects his confidence that once the program rolled out of the pilot phase, the private sector would come forward to play a major role. This is what happened.

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The Government, instead of depending on its old line agencies, acted on the advice of U.S. authorities and cut across bureaucracy to establish a supreme coordinating body in the RCPCC. Likewise, it acted against bureaucracy in deciding to use the Rice and Corn Administration to carry on the emergency production program. While this agency was a new institution, it had borrowed talent and experience in administration from other institutions. In its part, U.S.A.I.D., chose to concentrate its efforts with the RCPCC at the top level of Government, and with the offices of the RCA, and B.P.I. at the national and provincial levels, and Rural Banks in the provinces. However, U.S.A.I.D.'s decision to remain flexible enabled field personnel to work with the technicians of various agencies who were found to be the best change agents. U.S.A.I.D. also continued its support of provincial governments. A.I.D. concentrated resources on R.C.A., B.P.I., ACA and Rural Banks, and the provincial governments in the 2 and later 12 provinces.

Once the two pilot provinces had proven successful, the Government quickly selected 10 more key provinces from the country's 23, and concentrated efforts in these, working primarily through the RCPCC and the Rice and Corn Administration. The techniques of demonstrating, using trained agents and key farmers who were given special training was used to spread the new varieties to new areas along with the rice kits. The provincial governments were brought into the picture, using experience of the pilot areas. On its part, A.I.D. extended assistance to support the national Government's effort, backing the agencies mentioned, and also assisting provincial governments in organizing, managing, and maintaining their equipment pools, and establishing demonstration projects.

D14J

Once the technique caught on among farmers in a new area, it spread like the ripple of a wave, requiring little additional demonstration effort.

Of course, demonstration was not confined to Government either. In fact, despite the assistance, the logistics of Government often became bogged down, and private industry assisted Government agents with supplies to get demonstrations started in some instances. As was described under the fertilizer section, ESSO played an important role in demonstration work with farmers along with its distribution program for sale of inputs.

During FY's 1967 and 1968, the U.S.A.I.D., in addition to providing technical assistance and commodity support, provided much needed local currency to strengthen the program. As is normally the case, the budgets of the various agencies composing the RCPCC were largely committed for personnel services with little or no funds for operational expenses. The U.S.A.I.D. was able to supply p3.4 million which went for the support of such vital activities

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as in-service training courses for rice and corn technicians; travel and per diem for supervisory personnel; and supplies, materials and equipment to support operations. Without this support the RCPCC would not have been able to function in its role of manager-coordinator for the entire program. Nor, would the RCPCC have been able to perform the vital administrative and management functions necessary to make the program effective.

The Bureau of Plant Industry (BPI) has been perhaps the key agency within the RCPCC insofar as providing support for the rice and corn program. The USAID has provided $254,064 in commodity support for this agency from FY 67 and 68 funds. These commodities have been for the support of seed testing and production equipment, [illegible], tank transport equipment or experimental farms. Without this support the BPI would not be able to provide the essential functions to support the program.

A brief breakdown of U.S. financial support follows for FY 67 and 68 and an estimate FY 69:

DOLLAR FUNDED PROJECTS (000)

	67*	68*	69
U.S. Technicians	91.4	194.0	361.0
Commodities	29[illegible].3	261.7	347.0
Participants	[illegible].0	36.4	30.0
Contract Services	13[illegible].5	44.0	25.0
Other costs	[illegible].0	5.1	16.0
Total	52[illegible].2	541.2	779.0

*Mostly for rice production

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PHP FUNDED PROJECTS (000)

	67*	68*	69
Support RCPCC	₱ 1,300	₱ 2,100	₱ 1,250
Agricultural Credit Fund	5,500	-	-
Land Bank (feasibility study)	600	-	-
Other	250	33	-
Total	₱ 7,650	₱ 2,133	₱ 1,250

*Mostly for rice production

USAID advisors who work at the provincial level typically help strengthen the role of provincial governments in planning and implementing agricultural development programs. The success of their efforts are vividly demonstrated by the rapid expansion in the use of improved rice varieties in those provinces where USAID Agricultural Advisors are stationed. In addition to providing the extensive planting of new rice varieties, advisors have worked successfully with the Philippine Government in supervised credit programs, and toward the improvement of marketing systems. Requests have been received from many other provinces for similar technical assistance.

GOP agencies working in agriculture need continued assistance in establishing the administrative framework for implementing projects and providing the necessary logistics support. Assistance is also required in the areas of program evaluation and reporting. USAID feels that presently, at least, such assistance can best be offered by existing USAID technicians under ongoing programs. It might prove desirable to bring in consultants and other TDY personnel at some future point to supplement USAID efforts. An example of this type of TDY is the "Economic and Engineering Feasibility

D14P

Study of Storage, Handling and Marketing of Selected Crops" which was performed by Weitz-Hettelsater Engineers in 1967. Policy assistance appears to be especially needed in price stabilization and agricultural forecasting and data collection.

Key personnel in the GOP agricultural sector have received graduate level training in the U.S. With the imminent establishment of the CEAMES Regional Graduate School of Agriculture, the need for sending students abroad for quality graduate training will be greatly reduced in some disciplines.

Most GOP commodity requirements for research and accelerated crop production programs have been met with assistance from U.S. agencies, both public and private. The USAID input has been relatively small but appears to have been both adequate and important. Assistance from the USDA and private U.S. companies in the form of experimental plant materials, seed and agro-chemicals has been important and continues to be important, particularly now for secondary crops.

Periodically, the Mission, in joint planning with the host government, evaluates the need for agriculture sector loans and the possible use of PL 480 assistance in support of agricultural programs. For the past few years, there has been a shortage of local currencies to support such programs in the agricultural sector. This need had not been fully realized until the past year when due to the initial success of the rice program, new investment potentials in the agricultural sector have come to the front, and meeting credit demands has been very difficult.

It is difficult to determine whether the program in 1966, 1967, and 1968 would have gone over without U.S. technical and commodity assistance.

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Most certainly, progress would not have been so rapid. The two pilot provinces in which A. I. D. helped the Government launch the rice program provided information and data for expansion of the program. This experience saved time and reduced mistakes which would have been costly and could possibly have been politically fatal. The program definitely could not have gone forward without the ground work which had been done over the past 30 years by U. S. assistance, and without the assistance from such philanthropic foundations as Ford and Rockefeller. However, with the enthusiasm that had been generated by research results, it is difficult to imagine that those endowed with the missionary spirit from the results achieved in 1965 and 1966 would not have persevered over a period of years and found ways to have successfully carried out the pilot programs in which A. I. D. assisted, and assured the spread of the new varieties and techniques, even without U. S. assistance. This point is debatable.

Some people say that the B.P.I., was on the verge of a breakthrough with new varieties of rice when IRRI started, and probably would have succeeded without IRRI. In view of the experience that IRRI scientists brought to the Philippines, this is doubtful. Furthermore, while B.P.I. may have had the scientists to achieve such results, it is doubtful that without the support of IRRI scientists and A. I. D. they would have been able to influence Government acceptance of the potentials and Government policy to support a program to spread the varieties. Research did not have that much prestige in the Philippines, or in the developing countries in Asia in agriculture prior to IRRI.

DISO

It could well be that in the future, without sophisticated assistance in the area of price policy and other critically related policies, the program could flounder. Politics, which was relatively free from the production program, has already entered the supply arena on high policy levels.

The international market situation on rice could make the problems of stabilization by the Philippine Government an acute one. If world prices should decline considerably, as is anticipated within the next 2 to 5 years, the Government would have difficulty in maintaining a support price to farmers. Here is the area where policy and planning assistance will be needed: when to intervene, the degree of government intervention, and when not to intervene in domestic markets in order to achieve optimum production. This is not an easy, clear cut area. The U. S. has been struggling with this problem for decades and still does not have a solution that satisfies both farmers and urban consumers. The situation in the Philippines in the future has implications toward U. S. policy in its commodities programs in the Asian arena.

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IV. Economic, Social and Political Ramifications

1. The Current Situation

The rice production program has brought economic improvement to many farmers and the rural area. Some of the efficiencies have been passed on to consumers in lower prices. A new economic life and new methods of farming have been introduced and could very well continue. These benefits, however, could be lost if government policies are not followed that guarantee and protect the producer and consumer. Political mishandling of the supply situation on rice could also reverse benefits.

In terms of administrative lessons, perhaps the most beneficial effects to come from the program were the lessons learned in the pilot province approach to rural development. The introduction of micro-planning and implementation, i. e., planning and implementing programs at the provincial and/or municipal levels, were new for the government and AID. In the past, Central Government agencies were reluctant to delegate authority for planning and implementing programs directly involving provincial and municipal officials. The success of the two pilot provinces, however, left little doubt that strong, local leadership must be involved at all stages if projects are to succeed. The

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Philippines, for the past two years, has taken steps in the direction of de-centralization, or increased local autonomy. The pilot province approach and the rice production program have undoubtly influenced this trend.

The average small rice farmer of the Philippines has long been taken for granted and his destiny has been largely determined by the land-owner or farm administrator. He has had little choice other than to continue his livelihood in a state of economic despair. The introduction of the new rice varieties have changed this situation. The small farmer who tills only two hectares, even on a share basis, has a new lease on life. His eyes have been opened to the fact that he himself, with some technical guidance and credit assistance can produce 100 cavans of palay or more per hectare. This, for the first time in his life, makes him think like an "economic man". He realizes how much he is paying the landowner and clamors for a better deal. He has been disturbed and this disturbance has caused motivation. The small farmer is now demanding more support such as credit, technical guidance, irrigation facilities, a better market and other opportunities.

The new rice varieties have created situations in rice farming and the industry which did not exist. Because of a shorter growth period, the grain matures before the rainy season ends which creates a drying problem. This calls for the manufacture of dryers which will create a new industry. Since the texture of the grain is somewhat different from that of traditional varieties, and consumers are demanding better quality milled rice, now milling equipment and/or different techniques

D,54

are required to produce a higher quality milled rice.

Real quantitative data of the economic benefits accrued to the rural population as a result of the rice program are not available. However, there are several indicators visible in most of the rural communities that attest to the presence of additional capital. New houses are being constructed in practically every village. These new houses are generally of masonry or wood with sheet metal roof instead of the traditional thatched "nipa" huts. Also visible is a great amount of home repairs and alteration. This is a rather significant indication that more money is available in the village since these are generally cash purchases. Television antennas are appearing more and more in the rural villages. Motorcycles with side cars are rapidly replacing the horse drawn carriages (calesa); in fact, they are becoming quite a traffic hazard in some locations. Another section of this report describes the introduction and acceptance of small tractors and mechanization. Another indicator of greater affluence is the recognition of the industrial sector of the rural market in directing their sales campaigns to the rural population. These signs are apparent throughout many areas of the Philippines, and although the lot of the agricultural population has a long way to go it certainly indicates that it has improved.

More pressure is put on the government to construct and/or improve farm to market roads and irrigation systems. Subterranean water development is coming to the front for the first time and use of surface

DJJ

sources with pumps is increasing. New interests are being generated in the formation and/or revitalization of agricultural cooperatives. The 10 leading rice cooperatives during crop year 1967-68 extended a total of ₱5,811,912 for loans to farmer members. There was an increase in the number of active cooperatives and in their memberships, as has been reported in the section on credit.

The private sector is rising to the challenge. Fertilizer plants have been constructed and are expanding operations; insecticide formulating plants are expanding their operation; private seed producers, important in the successful expansion of the rice program, are organized into an association, and are establishing reliable quality seed production.

A rodent research and control program has been initiated within the past year and is largely GOP funded.

In addition to benefitting the farmers, the program has improved the balance of payments through elimination of rice imports and by exporting rice. Rice imports had been costing $20 to $50 millions annually prior to 1968. Locally produced rice and rice seed exported in 1968 earned $7 million. One private rice miller, the only one authorized by RCA to export, was able to meet international standards for rice and was selling 5% broken rice for $205 per M. T. in January 1969.

Production of rice and other crops must continue to rise at a more rapid pace in order to overcome the population expansion.[80/] Problems

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80/ See Table XXVI, XVII; op. cit., Golay, Tables 11 and 12.

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associated with increased production will continue to arise. The Philippine Government, the private sector, multilateral agencies, and AID are becoming more aware of the nature of such problems, however, and are more able to cope with them.

2. Resources Utilized for Increasing Rice Production in Connection with High Yielding Varieties.

Due to the complexity of the Philippine administrative organization and because of the many non-GOP entities involved, it is next to impossible to accurately quanitify in monetary values the total resources applied to the rice production program involving the high yielding varieties. As many as 20 GOP agencies have been involved in one way or another since the program started in 1966. Outside agencies in addition to the AID are many and have played important roles. One of the most important has been the International Rice Research Institute (IRRI), which invested $7 million in facilities in 1962 and has spent $3 million annually in its international program. During the two years 1966 and 1967, a lion's share of the benefits of its efforts went to the Philippines. Other entities such as the UN organization, the bi-lateral programs of Japan and The Republic of China (Taiwan), the Agricultural Development Council (ADC), the World Bank, the Asian Development Bank, the U.S. Peace Corps, and others have played important roles, but their financial and technical contributions in the rice program have been small. The private business sector has contributed greatly to this program; however, this is described elsewhere in this report.

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The GOP efforts really got underway in mid 1966. The emphasis on increased rice production started tapering off somewhat by mid 1968, at which time the activities of the RCPCC were expanded to include a wide range of food crops in addition to fish and livestock.

Five GOP agencies, i.e., the Agricultural Productivity Commission (APC), the Bureau of Plant Industry (BPI), the Agricultural Credit Administration (RCA), the Rice and Corn Administration (RCA), and the Bureau of Soils (BS) were deeply involved in the program of the new rice varieties. These five agencies have a total annual budget of about ₱60 million Pesos (not including loans fund or price support appropriations) for additional expenses. It is estimated that as much as 25 percent or ₱15 million of the total ₱60 million Pesos was expanded in connection with the rice production (high yielding varieties) program. Apart from this, special appropriations and/or allocations were made to the RCPCC. A breakdown by fiscal years is shown in Table XXXI. 81/

This Table does not include all the monetary resources that went into the high yielding varieties by any means. If we add ₱15 million Pesos from the budget of the five agencies, this would bring the total to near ₱50 million -- non-recoverable -- for the two year period. In addition to the five agencies which were largely involved, twelve or more others were involved to some degree and, in some cases, funds were not covered or only partially covered by the RCPCC. Included are such agencies as: The U. P. College of Agriculture (UPCA), the National

81/ USAID and RCPCC Records.

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Irrigation Administration (NIA), Presidential Arm for Community Development (PACD), the Irrigation Service Unit (ISU), the Bureau of Vocational Education (BVE), the Armed Forces of the Philippines (AFP), the Bureau of Lands (BL), the Central Bank (CB), the Development Bank of the Philippines (DBP), the Philippine National Bank (PNB), the Economic Council (NEC), the Rice and Corn Board (RICOB), and others. Probably as much as 10 million Pesos from these 12 agencies went into the program. Furthermore, it is a known fact that the so-called recoverable fund of ₱249 million was not, nor will not, be recovered in total. The ACA has lost rather huge sums in its buying operations, all of which are not chargeable to the high yielding varieties. Also, the ACA has lost in its fertilizer and seed financing program. The ACA and the Rural Banks will not recover all the loan fund. A conservative guess is that 20 per cent of the ₱249 million or approximately ₱50 million will be lost. This brings total non-recoverable funds up to ₱110 million for the two year period.

During FYs 1967 and 1968 approximately 800,000 hectares (accumulative total) were planted to the high yielding varieties. By using the arrived at expenditure of ₱110 million, this means that promotional or introductory costs per hectare ran around ₱137 per crop. This is the equivalent of the sale price for about 9 cavans of rough rice.

Calculation of foreign exchange costs would be almost impossible. The problems of determing what portion of the cost of the International Rice Research Institute (IRRI) should be charged to the Philippines is futile since its efforts are benefitting many countries throughout the world. To the degree that it is chargeable, IRRI's and AID's costs in

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addition to an undetermined quantity of commodities acquired through Japanese Reparations were the primary foreign exchange costs involved in the program. U.S. costs in the program are shown in another sectionof this report, as are U.S. Dollar loans for irrigation development. The IBRD advanced a $5 million loan for agricultural equipment during this period, and is considering other loans as mentioned elsewhere.

V. Future U.S. Role and Choices

It is believed that U.S. efforts should focus on policy issues facing the government, but at the same time continue work on development programs including improved techniques of crop production, particularly secondary and feed crops; demonstrating harvesting, drying, storage, milling and processing facilities for rice feed grain and secondary crops; and improvement in agricultural credit and agricultural marketing programs. The GOP agencies need continued assistance in developing the administrative and functional framework for implementing projects and in providing the necessary logistics support. The GOP and its agencies are responsible for the policies and decisions that are promulgated; therefore, the role of the U.S. in addition to logistic support, should be to counsel and advise as to the potential effects of alternatives open to policies and decisions and to help train those who conduct the functional aspects of development.

The achievement of self-sufficiency in rice has generated a whole complex of problems to government agencies. The technical assistance provided by the U.S. is important in helping the government agencies to cope with those problems. Basic production and marketing information is D160

badly needed by the GOP in order to determine whether or not to export rice, and what other crops and commodities have export markets and can be grown economically in the Philippines. Marketing systems for rice, secondary food crops, feed crops, livestock and poultry are inadequate to cope with expanded production. Methods and procedures for extending credit, particularly supervised credit is undergoing development changes. Facilities that contribute to a sophisticated marketing system for various types of agricultural products are being sought and developed for the country, e.g., harvesting, drying, storage, and milling facilities for rice and feed grains and the processing and preservation equipment for livestock and poultry meat and food crops. These are some of the technical areas that the U.S. can and is assisting GOP with advice and logistical support.

The policy implications for U.S. commodity programs (PL 480) and their potential effect in the markets of Asia and influences on internal stabilization programs and economies within these countries need careful review.

As mentioned above, the Philippines through present arrangements has adequate research capabilities to meet most present needs in rice, with the assistance of IRRI, the Cornell University Contract and their sponsors, and the Rockefeller and Ford Foundations. Adequate arrangements already exist between local institutions and U.S. centers for exchange of information and other technical problems which are encountered. Philippine institutions will continue to need assistance along the above lines for an indefinite period.

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V. Economic, Social and Political Implications for the Future

Future economic development and political stability can be greatly influenced by the manner in which the Government exploits and follows through its successes in the rice program, and applies the lessons learned to other agricultural and economic development. Critical decisions lie ahead on policies that will affect the future of the rice industry as well as that of other agricultural crops in the country. Policies on pricing, export, agricultural research and alternate uses of resources for other crops are some of the important areas where critical decisions are to be made. Decisions based on inaccurate and politically biased statistics and information could negate the successes. Reliance on scientific methods of obtaining statistics and technical information, free from political bias, is a necessary basis for rational planning in Government. Basic to the development of the economy and its political stability are achieving and maintaining an appropriate balance of the level of the population with the resources of the country.

Effective demand is created with purchasing power. Experience in 1968 has shown that at the current per capita income, supply and demand for rice became equalized at a level of consumer prices below the previous level by about 25 per cent. As population expands, there must be a proportional increase in economic growth in order to maintain the same level of per capita income. Continued increase in the population at the current rate could outpace economic gains and dilute benefits, causing per capita income to decrease. Inadequate distribution of income could achieve the same results. The degree that this occurs, or is prevented, will

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depend on the rate of development in both the industrial and agricultural sectors, and on taxation and fiscal policies of the Government to achieve an adequate distribution of incomes. But checking population growth is important for the future of the economy, not only in terms of food balances, but also in terms of real per capita incomes and improved diets. These have direct bearing on the future of agriculture, the well being of the Philippine farmers, and the welfare of the country.

In the long run, there is the question of the ability of the Philippine farmers to compete with farmers of other Asian countries (and developed countries) in rice production for export trade. In a free world market (without competition from countries subsidizing exports of rice and other grains, practiced by some countries), the Philippine farmers could probably hold their own in the future on irrigated land, and perhaps on some of the better non-irrigated lands which receive adequate water from rains, provided the farmers have assistance in the drying, processing, and marketing industries in improved efficiencies. However, farmers on some of the less fertile, hilly, non-irrigated uplands could not compete. Therefore, it appears that water availability and irrigation development will hold the key for the future of rice farming in the Philippines vis-a-vis the rest of the world, and for rational use of the country's resources.

Government policy must be aimed at achieving optimum uses of its resources. Government is obliged to protect its people against natural disasters which destroy crops by maintaining some strategic reserves of rice, accumulating these to stabilize producers' prices during periods

of abnormal surpluses, and using the reserves to stabilize consumers' prices during periods of acute shortages. The Government also has the obligation to protect its farmers against the vagaries of international markets, export subsidies, and government supported programs in other countries which give their farmers economic advantages. These are realities that operate against free world markets. At the same time, rational uses of resources dictate that the Government of the Philippines should not subsidize inefficient agriculture, meaning marginal cultivation of rice on lands less suitable for rice and more suitable for other crops. Achieving the optimum in these respects requires sophisticated and objective appraisals, planning, and decision making. It also requires sound programs of research to establish opportunities and guidelines for agricultural development. Research must determine the most suitable crops for lands marginal for rice, and must make these crops competitive in efficiency of production with their culture in other producing countries, in order to open domestic markets as well as to export. There is a need to do international market research to learn the potential markets and commodities needed which could be produced and processed advantageously in the Philippines. Government must assist in such market studies. It must also assist in crop and product development to meet the requirements of an export market in kinds and quality of fresh and processed agricultural products, aiming at introducing efficiencies of production and processing that will open wider domestic markets as well as being competitive internationally. Thus, through more efficient feed production, new opportunities will be opened for the livestock and poultry industries by cheaper meat.

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Although rice is the basic food crop supporting the increasing population, the long-term increase in food supply may lean heavily on secondary crops. Since 75 percent of the arable land depends upon rain as a source of water, only one crop of rice is possible per year on such land; yet, much of that area has sufficient water reserve in the soil to produce a vegetable or second crop. Hence, the total food supply can be substantially increased by the production of secondary crops. Also, the food habits of the population will need to shift to more utilization of the foods that can be produced as secondary crops and less dependent upon rice. Such a shift will likely be slow, but would contribute to the national economy and social welfare of the population.

Appropriate diversification in agricultural production should be part of a self-sufficiency policy. It has been demonstrated that crops, such as vegetables, corn, melons, mung beans and other crops can be successfully grown during the dry season. However, marketing problems for handling peak production for such crops have to be solved by appropriate storage and processing facilities.

The extent to which diversification in agriculture is to be emphasized is a major government policy in allocating resources, such as financing and credit, and rational utilization of land and water resources. Self-sufficiency in rice has brought to light the acute need for harvesting, drying, storage, milling, and marketing facilities, and it has opened new potentials for secondary crops. If, however, the production of secondary crops is to be efficient, they must be supported by adequate research, farmers must be supported with adequate credit, and industries

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must be encouraged and assisted in developing facilities for improved and more efficient marketing of agricultural commodities, meat, and poultry.

The principal resource that must be developed are water and land for irrigation. 82/ Additional sources of water are needed for existing irrigated land and for increasing the area under irrigation. Ground water resources need further exploration and development. Shallow and deep wells can increase the supply of water for irrigation. There are relatively few wells, either shallow or deep, that are used for irrigation at present. Most irrigation comes from existing dams that divert water. There are few dams that impound large quantities of water.

The GOP will need assistance in long range planning for the efficient allocation of available resources, both physical and capital. The improvement in the foreign exchange situation resulting from the cessation of rice imports could be offset by reckless expenditure in other sectors. GOP statistics indicate that this may be happening to an alarming degree.

82/ See Tables XVIII, XXIX, XXX. Tables 15, 16, 17. Golay estimated requirements for irrigation for meeting the requirements. While the HYV have reduced these needs somewhat for the period that is estimated, development of irrigation beyond rice requirements will still be in part out for other crops.

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TABLE I

Philippines: Area Planted to Rice, Yields, and Production

Year	Area Planted Rice (Hectares)	Yields-Rice Palay (Paddy or Rough) (kg./hectare)	Production Rice, Palay (Paddy or Rough) MT	Net Imports[b] (Milled Rice Equivalent) MT
1910-14	1,140,194	757		
1915-19	1,251,342	960		
1920-24	1,630,636	1,102		
1925-29	1,770,180	1,199		
1930-34	1,848,558	1,188		
1935-40	2,005,240	1,104		
1946-47	1,879,600	984	2,088,240	83,880
1947-48	2,026,380	1,111	2,240,835	96,656
1948-49	2,164,100	1,106	2,491,239	135,576
1949-50	2,214,000	1,151	2,606,058	neg.
1950-51	2,231,800	1,177	2,616,390	129,864
1951-52	2,466,040	1,162	2,830,745	63,112
1952-53	2,635,000	1,148	3,144,156	neg.
1953-54	2,645,440	1,184	3,182,432	42,646
1954-55	2,655,540	1,203	3,201,521	63,504
1955-56	2,742,480	1,206	3,272,939	42,392
1956-57	2,768,120	1,194	3,345,543	77,896
1957-58	3,154,100	1,016	3,203,093	290,664
1958-59	3,329,410	1,107	3,684,061	6,496
1959-60	3,306,460	1,131	3,739,059	neg.
1960-61	3,197,750	1,159	3,704,311	9,200
1961-62	3,179,190	1,230	3,909,586	30,560
1962-63	3,161,320	1,255	3,956,507	4
1963-64	3,088,000	1,244	3,842,398	300,000 [a]
1964-65	3,200,000	1,248	3,991,984	569,800
1965-66	3,209,180	1,310	4,072,684	569,800
1966-67	3,165,830	1,378	4,362,921	108,009
1967-68	2,980,950	1,761	5,249,527	220,529*

Footnotes:

a/ Rice and People in 1990 - Philippines by Frank Golay and Marvin E. Goodstein Table A4, p.46; Table A6, p. 48 (USAID-Philippines)

b/ Figures for years 1966-67 taken from publications World Agricultural Production and Trade Statistical Report, USDA (June 1967); Figures for 1967-68 taken from The World Agricultural Situation. Review of 1967 and Outlook for 1968, Foreign Agricultural Economic Report No. 38, USDA, (Feb. 20, 1968).

c/ A conversion factor of .65 is used for milling loss after deducting 7% for loss of grain before milling.

*Quantity received		291,453 MT
Less re-exported	33,500 MT	
Barter (foreign)	37,424 MT	70,924 MT
	Net Import	220,529 MT

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TABLE I - 1

RCA RICE IMPORTATION SINCE 1964

Year	Origin	Variety	Quantity (in M.T.)	Value Dollars	Value Pesos
1964	Burma	Ngasein SMS	100,000	$ 10,980,000	₱ 42,931,800
	Thailand	TPS	115,000	13,440,750	52,533,333
	Cambodia	Java No. 2	10,000	1,164,800	4,554,368
	USA	Nato No. 5	75,000	10,642,914	41,609,884
			300,000	$ 36,227,464	₱141,649,385
1965	Burma	Ngasein SMS 35%	304,800	$ 33,820,608	₱132,238,577
	Thailand	TPS	130,000	14,813,500	57,920,785
	Cambodia	Java No. 2	40,000	4,390,000	17,164,900
		Japan No. 2	20,000	2,279,000	8,910,890
	USA	Sample No. 5	75,000	10,382,600	40,595,966
			569,800	$ 65,685,708	₱256,831,118
1966	Burma	Ngasein SMS 35%	18,986.45	$ 2,447,923	₱ 9,571,379
		Fnata SMS 35%	3,500	514,500	2,011,695
		Burma 1 & 2	9,342.85	1,088,442	4,255,808
	Bangkok	Spl Mix	24,600	3,444,000	13,466,040
		A-1 Super	24,800	3,248,800	12,702,808
	Taiwan	Tsai Lai	10,000	1,336,000	5,223,760
	UAR	Fancy Grade 0	2,000	233,000	911,030
		Grade 1	13,780.50	1,605,428	6,777,223
		Grade II	1,000	115,500	451,605
			108,009.80	$ 14,033,593	₱ 54,871,348
1967	Burma	SMS 35%	30,401	$ 3,973,423	₱ 15,536,037
	Bangkok	TPS	98,281	13,404,705	52,646,997
	Cambodia	Cambodia Rice	15,049	2,607,390	10,194,395
	Alexandria	Egyptian Rice	31,506	4,917,570	19,286,334
	Venezuela	Venezuela Rice	31,192	5,731,102	22,155,449
	USA	U.S. Rice	14,120	2,460,410	9,620,203
			220,529*	$ 32,[illegible]	₱127,440,965

NOTE: No importation in 1968.

* - Quantity Received 291,453
Less: Re-exportation..... 33,500
Barter (Foreign) 37,424 70,924

NET IMPORT 220,529

Conversion Factor: 1 US$ = ₱3.91

TABLE I-A D168

TABLE I-B Palay (rough rice)
Area (hectares) by region, Philippines
Crop Year 1960 to 1967

Region	1960	1961	1962	1963	1964	1965	1966	1967
Philippines	3,306,460	3.197,750	3,179,190	3,161,320	3,087,450	3,199,670	3,109,180	3,090,12
Ilocos	104,750	110,630	104,620	119,920	120,080	139,220	144,710	132,29
Cagayan Valley	344,380	453,890	370,620	313,250	289,710	344,180	354,390	245,52
Central Luzon	682,520	545,730	513,550	520,760	495,700	510,240	519,310	602,06
Southern Tagalog	377,080	363,850	406,860	398,410	414,080	433,280	467,290	466,99
Bicol	239,650	317,800	290,540	310,530	305,370	299,260	366,910	308,98
Eastern Visayas	428,980	377,940	283,770	289,760	274,600	299,470	323,480	346,85
Western Visayas	569,080	414.310	400,960	415,950	396,310	383 680	377,870	333,20
Northern and Eastern Mindanao	252,070	172,380	254,490	243,350	226,100	218,600	145,090	180,85
Southern and Western Mindanao	307,950	441,220	553,780	549,390	565,500	571,740	410,130	467,38

Source: Bureau of Agricultural Economics, Annual Crop Report
January 1968.

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TABLE I-C [10/]

GRAVITY IRRIGATION IN CENTRAL LUZON

Province	Area (Hectares) National	Gravity
Pampanga	7,500	12,315
Bulacan	29,130	4,738
Nueva Ecija	70,150	12,080
Bataan	1,920	6,196
Tarlac	29,940	8,825
Pangasinan	22,520	17,551
	161,050 hectates	61,705 hectares

Total National and Gravity Irrigation - 222,765 hectares

- 77,282 hectares [10a/]

300,047 hectares

10/ Source: National Irrigation Administration
As of February 26, 1969.

10a/ Source: IBU as of January, 1968.

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TABLE [illegible]

RICE AND CORN ADMINISTRATION
Quezon City

EXPORTATION OF LOCAL RICE (1968)

DESTINATION	VARIETY	QUANTITY (Ave M. T.)	UNIT PRICE	PESOS
Indonesia	Special	7,000	₱ 684.25	₱ 4,789,750.00
	Ordinary	3,000	613.87	1,841,610.00
India	Ordinary	3,500	637.33	2,230,655.00
India	Ordinary & Special	6,500	637.33	4,142,645.00
India	Ordinary & Special	8,800	617.46	5,433,668.00
Indonesia	Special	4,000	601.20	2,404,806.00
	Ordinary	3,700	547.40	2,025,380.00
	Total	36,500		₱22,888,514.00

NOTE:
Includes Milfex Exportation
of 10,000 tons.

EXPORTATION OF CERTIFIED PALAY SEEDS

DESTINATION	VARIETY	QUANTITY (M. T.)	UNIT PRICE	PESOS
1. South Vietnam	IR8	1,819	₱ 710.22	₱ 1,291,889.37
South Vietnam	IR5	205	840.90	172,386.48
2. Laos	IR5	2	840.83	1,681.65
Laos	IR8	0.44	710.23	312.50
3. Liberia	IR8	1	710.31	710.31
Liberia	IR5	2	840.83	1,681.65
4. Israel	IR8	255.30	710.61	181,416.44
5. Spain	IR8	120	710.22	85,226.25
6. Venezuela	IR8	100	710.22	71,022.88
7. Ceylon	IR8	210	710.22	149,146.25
8. Indonesia	IR8	0.26	710.35	184.69
9. U.A.R.	IR8	105	710.22	74,573.13
10. Pakistan	IR8	3,500	710.22	2,485,768.75
11. Burma	IR8	50	710.22	35,510.94
12. Panama	IR8	10	710.22	7,102.19
	Total	6,380		₱ 4,558,612.48
	Grand Total	42,880		₱27,447,126.48

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TABLE II 1/

Philippines: Population

Year	Population (000)	Year	Population (000)
1910	8,220	1935	14,731
1911	8,387	1936	15,084
1912	8,576	1937	15,449
1913	8,786	1938	15,814
1914	9,016	1939	16,000
1915	9,269	1940	16,460
1916	9,542	1947	17,786
1917	9,836	1948	19,144
1918	10,314	1949	19,674
1919	10,324	1950	20,275
1920	10,445	1951	20,894
1921	10,673	1952	21,533
1922	10,908	1953	22,191
1923	11,152	1954	22,869
1924	11,405	1955	23,568
1925	11,666	1956	24,288
1926	11,935	1957	25,030
1927	12,212	1958	25,795
1928	12,498	1959	26,584
1929	12,792	1960	27,410
1930	13,094	1961	28,313
1931	13,405	1962	29,257
1932	13,724	1963	30,24[illegible]
1933	14,051	1964	31,270
1934	14,387	1965	32,345
		1966	33,300
		1967	34,583 a/
		1968	35,688

1/ Rice and People in 1990 - Philippines by Frank Golay and Marvin E. Goodstein, Table A1, p. 43.

a/ Population Rate of Growth = 3.4% per year. Figures for 1966, 1967, and 1968 based on earlier figures.

TABLE XIX

Philippines: Rice Area Per Capita

Crop Year	Rice Area Hectares Per Capita
1910-14	.133
1915-19	.127
1920-24	.151
1925-29	.145
1930-34	.135
1935-40	.129
1946-47	.106
1947-48	.106
1948-49	.110
1949-50	.109
1950-51	.108
1951-52	.115
1952-53	.120
1953-54	.116
1954-55	.113
1955-56	.113
1956-57	.111
1957-58	.122
1958-59	.125
1959-60	.121
1960-61	.113
1961-62	.109
1962-63	.105
1963-64	.099
1964-65	.099

Rice & People, Golay and Goodstein, Table A-4, p. 46

TABLE XV a/

Comparison of Rice Yields in Countries of Asia for 1965

COUNTRY	YIELDS a/ (Kg. per Hectare)
Japan	4950
China (Taiwan)	3780
Korea (South)	3850
Malaysia:	
West Malaysia	2710
Sabah	2600
Sarawak	870
Vietnam (South)	1990
Ceylon	1770
Indonesia	1880
Pakistan	1680
Thailand	1610
Burma	1660
India	1310
Philippines	1310
Cambodia	1070
Nepal	2010
Laos	810

a/ Production Year Book, 1966, Vol 20, Food and Agriculture Organization of the United Nations

TABLE XV a/

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TABLE 7

Philippines: Area Planted, Production and Yields of Irrigated and Non-Irrigated, First Crop Palay, 1960

	Area Irrigated, first crop Palay (Has.)	Area Non-irrigated, 1st crop Palay (Has.)	Production Irrigated, 1st crop Palay (MT)	Production Non-irrigated 1st crop Palay (MT)	Yield Irrigated 1st crop Palay (Kg./Ha.)	Yield Non-irriga 1st c Palay (Kg.
Bulacan	19,894	33,926	36,211	45,830	1,820	1,351
Nueva Ecija	72,127	86,199	137,700	133,346	1,909	1,547
Pampanga	22,124	24,251	52,700	35,614	1,672	1,469
Pangasinan	44,449	63,892	71,735	68,739	1,614	1,076
Tarlac	31,209	51,446	60,182	66,892	1,928	1,300
Central Luzon Basin	199,803	259,714	359,528	350,421	1,799	1,349
Laguna	17,372	4,463	30,867	6,090	1,777	1,373
Cavite	12,873	3,767	21,382	3,509	1,661	932
Cotabato	38,274	83,245	50,047	101,991	1,308	1,225
Agusan	1,732	8,029	1,922	8,447	1,110	1,052
Camarines Sur	21,529	27,583	31,411	31,492	1,478	1,142
Cagayan	7,654	48,514	13,409	65,136	1,752	1,343
Isabela	25,887	65,094	43,237	85,762	1,670	1,300
Above listed provinces	325,124	501,282	551,803	652,848	1,697	1,302
Total, Philippines	592,413	1,072,587	933,033	1,277,804	1,575	1,190

Bureau of Census and Statistics, Agricultural Census, Summary, Table 17.

Rice and People in 1990, Goley and Goodstein, Table C-1, p. 109

TABLE VI

Returns and costs per hectare of rough rice on irrigated farms using improved, seedboard approved and local varieties, Pampanga and Bataan, Philippines, 1966-67.a/

	1967 dry season				1966 wet season			
	IR 8		BPI-76-1		Other seedboard		Local	
	Owner/ operator	50/50 share	Owner/ operator	50/50 share	Owner/ operator	50/50 share	Owner/ operator	50/50 share
of farms	16	28	4	7	8	22	9	6
Cash:								
Fertilizer (P)	194	128	172	101	53	49	46	22
Chemicals (P)	51	47	32	6	12	8	14	31
Other cash costs (P) b/	334	210	157	163	189	105	167	135
Cost in kind (P) c/	106	182	235	138	131	119	111	141
Total cash costs and in kind (P)	685	567	596	408	385	281	338	329
Total costs (P)	957	828	864	527	765	650	728	667
Labor input: (man-days)	85.7	74.6	90.1	78.3	71.9	59.0	64.6	64.5
Yield of rough rice in:								
Kg./ha	4523	4268	3740	3080	3036	2464	2948	2200
Cavans/ha	103	97	85	70	69	56	67	50
Average area of variety/farm (ha)	1.96	1.72	2.38	2.40	1.87	3.59	2.71	2.18
Gross return d/ (P)	1648	1552	1360	1120	1104	896	1072	800
Net return:								
Over cash costs and in kind (P)	963	985	764	712	719	615	734	471
Over all costs (P) e/	691	724	696	593	339	246	344	133

IRRI Report 1967, Table 1, p. 4

a/ Improved varieties include IR-8, IR-5, C-18, C4-63, and BPI-76-1. Other seedboard varieties include Peta, Milflor, Seraup Ketchill, BE-3 and Tjeremas.

b/ Include cash costs for land preparation, pulling of seedlings, transplanting, and transportation.

c/ Costs in kind include costs of harvesting, threshing, and seeds.

d/ P16/cavan or P0.36/kilogram of rough rice. $1.00 = P3.90.

e/ Include charge for land, family and operator labor.

TABLE VII *

Returns and costs per hectare of rough rice on farms using two rice varieties, Rizal. 1966 and 1967 dry season, 1966 wet season.a/

	1966 dry		1967 dry		1966 wet	
	IR-8	Binato b/	IR-8	Binato	Irrigated	Rainfed
No. of farms	4	143	200	127	37	8
Costs						
Fertilizer (₱)	270	50	146	39	159	91
Chemicals (₱)	45	10	61	4	114	132
Other cash costs (₱) c/	287	210	193	83	-	-
Costs in kind (₱)	539	176	379	249	-	-
Total cash cost & in kind (₱) d/	1141	446	779	375	-	-
Yield of rough rice in:						
kg/ha	7267	3276	5852	3165	5332	4721
cavans/ha	165	75	133	72	121	107
Average area of [illegible] per farm (ha)	0.81	0.71	0.63	0.64	[illegible]2	0.98
Gross return e/ (₱)	2640	1200	2128	1152	1936	1712
Net return:						
Over cash costs and in kind (₱)	1499	754	1349	777		

a/ These data are summarized from the records provided by the Agricultural Development Council of Rizal. Results of the 1966 and 1967 dry season are based upon a sample taken throughout the province of 1967. The data for 1966 wet season are from all those farms participating in the ADCR program.

b/ This variety is also known as Thailand.

c/ Include cash costs for land preparation weeding, transplanting, pulling of seedlings, and irrigation.

d/ Costs in kind include costs of harvesting, threshing, and seeds.

e/ ₱4.6/cavan or ₱0.36/kilogram of rough rice.

*Agricultural Economics, Annual Report for 1967, IRRI (by Randolph Barker), Los Banos, p. 8.

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TABLE VIII[a]

Input and output information per hectare for lowland rice farms of three selected areas, Laguna 1966 and 1967 wet seasons.[b]

	Variety: Local to IR8		Local		Local to IR8 and local		
	1966	1967	1966	1967	1966	1967	1967
No. of farms	59	59[b]	44	44[b]	46	46[c]	46[c]
Inputs:							
Seed (kg/ha)	16	75	15	20	19	76	24
Fertilizer expenses (₱/ha)	28	99	24	30	31	106	38
Herbicides expenses (₱/ha)	5	8	4	9	4	7	2
Insecticides expenses (₱/ha)	3	19	2	5	3	18	5
Labor (man days/ha)[d]	54	76	52	50	53	79	51
Yield (rough rice/ha):							
kg/ha.	2420	4224	2288	2112	2596	4752	2620
Cavans/ha	55	98	52	48	59	109	57
Average price of variety (₱/cavan)	2.4	2.4	2.4	2.4	2.5	1.1	1.3

a/ The term local includes all native varieties.

b/ Typhoon damage was reported on 15 farms growing IR8 variety and 11 farms growing local varieties in 1967. The estimated loss per hectare was 3[illegible] cavans for the IR8 and 9.6 for the local.

c/ Typhoon damage was reported on farms growing IR8 and local varieties in 1967. Of these farms estimated damage of 28.5 cavans per hectare on IR8 variety and 6 farms estimated damage of 7.5 cavans per hectare on local varieties.

d/ Labor inputs did not include labor for harvesting and threshing.

e/ IRRI Report 1967, Table 3 p.11

TABLE VIII

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TABLE VIII - B

SUMMARY

AREA HARVESTED AND PRODUCTION OF RICE
CROP YEAR 1967 - 1968

PRIORITY AREAS	VARIETIES: IR-8 IR-5	BPI-76-1	C-18 C4-63	SUB-TOTAL	OTHER SEEDLOAN VARIETIES	OTHER VARIETIES	GRAND TOTAL
AREA HARVESTED	(HAS.)	(HAS.)	(HAS.)	(HAS.)	(HAS.)	(HAS.)	(HAS.)
I	160,789	82,490	7,147	250,426	402,573	1,0[illegible],022	1,653,021
II	44,421	19,189	1,396	65,006	115,219	6[illegible],962	750,187
III	22,996	13,534	501	37,031	31,812	2[illegible],451	306,2[illegible]
TOTAL	228,206	115,213	9,044	352,463	549,604	1,885,435	2,767,50[illegible]
PRODUCTION	(CAVS.)	(CAVS.)	(CAVS.)	(CAVS.)	(CAVS.)	(CAVS.)	(CAVS.)
I	12,840,160	5,120,079	618,689	18,578,928	19,194,531	38,[illegible]34,950	5,618,215
II	4,055,720	1,323,380	90,577	5,469,677	5,789,621	19,[illegible]37,230	31,196,578
III	1,629,732	674,690	33,200	2,337,622	1,244,254	7,[illegible]09,335	11,[illegible]91,21[illegible]
TOTAL	18,525,612	7,118,149	742,466	26,386,227	26,228,206	66,[illegible]01,57[illegible]	215,300,00[illegible]
AVERAGE YIELD PER HECTARE							
I	80	62	87	74.19	47.68	37.35	65.20
II	91	69	65	84.14	50.25	32.69	55.48
III	71	50	66	63.13	39.11	33.59	37.75
TOTAL	81	62	82	74.86	47.72	35.37	47.80

SOURCE: RCPCC Field Offices

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TABLE VIII - C

S U M M A R Y

AREA PLANTED TO HIGH-YIELDING RICE VARIETIES
CROP YEAR 1968-1969
AS OF DECEMBER
(HECTARES)

First Crop (July-Dec., 1968)

PRIORITY AREA	TARGET	IR-8 IR-5 IR8-68	BPI-76-1	C - 18 C4-63	TOTAL	INCR. OVER TARGET Area	%
	198,000	145,102	41,699	15,344	202,145	4,145	2
	59,000	53,638	24,784	17,070	95,492	36,492	62
	36,000	21,966	15,602	4,206	41,774	5,774	16
TOTA	293,000	220,706	82,085	36,620	339,411	46,411	16
[illegible] for July [illegible], 1967 Spring Season	200,000	159,840	70,731	6,913	237,484	37,484	19
INCREASE	93,000	60,866	11,354	29,707	101,927	8,927	
%	46.5	38	16	430	43	-	10

Source: RCPC Field Offices.

D.90

TABLE VIII - D

S U M M A R Y

PROGRESS REPORT ON AREA PLANTED TO ROICE

1ST CROP JULY-DEC. 1968 (CY 1968-69)

AS OF DECEMBER

(HECTARES)

Period / Area	High-Yielding Varieties	Other Seedbeard Varieties	Other Varieties	Total
I	202,[illegible]5	312,335	639,645	1,[illegible]
II	[illegible],[illegible]2	87,613	365,576	561,[illegible]
III	[illegible],[illegible]6	70,261	121,440	231,[illegible]
Total	339,[illegible]	470,209	1,126,661	1,931,28[illegible]

Source: RCC Field Offices

TABLE [illegible] - E

SUMMARY

PROGRESS REPORT ON RICE HARVEST
CROP YEAR 1968-1969
AS OF DECEMBER

	VARIETY						
	IR-8 IR-5 IR8-68	PPI-76-1	C -18 C4-63	Sub-Total (HYVs)	Other Seedboard Varieties	Other Varieties	Grand Total
	83,223	34,203	10,189	127,615	12[illegible],216	233,242	482,073
	43,187	16,526	4,857	64,570	46,927	228,487	338,984
	13,826	10,445	3,233	27,504	3[illegible],919	101,943	161,366
	141,236	61,174	18,279	219,689	19[illegible],062	563,672	98[illegible],423
	6,095,999	[illegible],289,741	799,032	9,784,772	4,881,136	6,838,95[illegible]	21,[illegible]04,8[illegible]
	3,478,882	[illegible],089,260	346,379	4,913,721	2,1[illegible]2,754	7,726,56[illegible]	1[illegible],53,0[illegible]1
	987,564	700,603	211,304	1,899,471	1,137,917	3,214,8[illegible]	[illegible],352,2[illegible]
	1,161,645	[illegible],079,604	1,356,715	16,597,964	8,131,807	17,780,[illegible]	42,[illegible]10,1[illegible]
Yield per ha	79.59	66.69	74.22	75.55	40.85	31.54	[illegible].27

[illegible] Field Offices.

Note: Crop Year (CY) starts July 1

TABLE VIII-E

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TABLE VIII - F

PALAY PRODUCTION AND AREA HARVESTED - WET SEASON (JULY-DEC., 1967-68

	IR-8				BPI-76				C-18		
	Production (000 cavans)	% of Total	Area Harvested (000 hectares)	% of Total	Production (000 cavans)	%	Area Harvested (000 hectares)	%	Production (000 cavans)	%	Area Harvested (000 hectares)
Priority I(12)	4,110	16.3	43	6.9	1,524	6.4	23	3.7	117	.04	[illegible]
Priority II(27)	1,355	10.0	15	4.2	724	6.0	10	2.8	60	.40	[illegible]
Priority III (19)	343	9.5	5	4.1	97	2.7	3	3.1	9	.70	[illegible]
T O T A L	5,808	13.8	63	5.7	2,345	5.7	6	3.2	188	.40	[illegible]
	OTHER SEEDBOARD				OTHERS				TOTAL VARIETIES		
Priority I	5,380	21.0	120	19.0	14,240	56.3	441	70.2	25,372	100.0	[illegible]
Priority II	2,963	22.4	51	14.1	8,118	61.2	287	79.7	13,220	100.0	[illegible]
Priority III	361	10.0	[illegible]	9.3	2,790	77.6	89	84.3	3,600	100.0	[illegible]
T O T A L	8,704	20.8	181	16.4	25,148	57.5	817	74.5	42,192	100.0	1,0[illegible]

Source: RCFCC Monthly Progress Report, January 1968.

Note: Data is as of January 1968

Cumulative totals were arrived at by summing the production figures and area harvested for the three priority groups and then performing the necessary mathematical operations and not by merely taking an average of the percentages.

TABLE VIII-B

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TABLE IX d/

Tarlac

Total first crop wet season	21,160 hectares
Total second crop dry season	4,969 hectares
Total gravity irrigation first crop	36,988 hectares
Total gravity irrigation second crop	8,491 hectares

Tarlac

High-Yielding Rice Varieties

Crop Year	Wet Season (June-December)			Dry Season (December-May)		
	Hectares Planted to HYVs	Percent of Available Hectarage 1/	Average Yield	Hectares Planted to HYVs	% of Available Hectarage	Average Yield
1966/67	137	.3%	167 cav/ha.	3,954	39.5%	102 cav/ha.
1967/68	29,194	62%	91 cav/ha.	17,586	90%	2/
1968	20,341	Production Cavans 1,717,834		Average Yield ha. 84.45		

Laguna

Season	Irrigated Hectares: Total Available a/	Planted to IR-8 b/: Number	Planted to IR-8 b/: Percent	Production (in cavans) b/: Total	Production (in cavans) b/: Computed Yield per Hectare
Dry 1966 (Jan-June)	9,598	.13	.001	27	207
Wet 1966 (July-Dec)	17,372	11	.060	1,113	100
Dry 1967 (Jan-June)	9,598	3,112	32	n.a.	n.a.
Wet 1967 (July-Dec)	17,372	10,000	58	n.a	n.a.

1/ Of Irrigated Area
2/ Not yet harvested
3/ RCPCC Annual Report 1967-68

a/ Sources 1960 Agricultural Census of the Philippines, Bureau of Census and Statistics.

Source: Office of RCPCC Provincial Director, Tarlac, Tarlac

a/ Sources Office of the Provincial Governor, Sta. Cruz, Laguna
b/ RCPCC Annual Report 1967-68
c/ Data Tarlac Agricultural Development Report USAID/ORD, 1966-67

High Yielding Varieties

Crop Year 1967/68 c/	Total HYVs Area Hectares	Production Cavans	Average Yield Per/Ha.
Laguna	20,896	1,829,120	87.53

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TABLE X

Total distribution of certified seeds by the BPI in the Philippines, crop year 1960-61 to 1967-68

Year	Cavans distributed	Percent of all seeds required	Price of certified seeds
1960-61	4,343	0.14	12.50
1961-62	5,112	0.16	12.50
1962-63	20,823	0.66	12.50
1963-64	24,866	0.81	12.50
1964-65	14,926	0.47	19.00
1965-66	19,996	0.65	22.00

IRRI Report 1967, p. 51 Table 14.

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TABLE XI

IR8 seed multiplication program of RCPCC 48 RCPCC farmer-cooperators, Philippines, crop year 1966-67.[a]

	Wet	Dry
Total seeds used - cavans [b]	553.70	1,174.10
Total area planted - ha.	546.80	1,162.30
Area planted per farm - ha.	12.71	33.20
Yield per hectare	106.70	95.30
Total production - cavans	58,354.50	110,797.00
Total volume sold for seeds - cavans	27,637.00	23,439.00
Total volume sold for commercial - cavans	14,109.60	31,901.50
Total volume retained for seeds - cavans	3,634.50	10,974.50

a/ Although 48 farmers were involved in the program only 43 participated during the wet season and 35 during the dry season.

b/ One cavan equals 44 kilograms.

IRRI Report 1967, p. 54, Table 15

D196

TABLE XII

Price of Paddy Rice in Selected Countries (1)

Countries	Price Paddy Rice (2) To Farmers-1966		Rice Yield per Hectare	Fertilizer per Hectare	Arable Land per Person	Arable Land Irrigated
Regional Countries	Local Currency per kg.	U.S. Cents per kg.	Kilo-grams	Kilo-grams	Hectares	Percent
Afghanistan	NA		1520	-	.59	-
Burma	(1965)0.148 Kyats	3.1	1640	3	.62	5
Cambodia	NA		1100	-	.48	-
Ceylon	(1965)0.57 Rupees	12.1	2000	39.1	.17	20
India	NA		1610	4.4	.35	16
Indonesia	NA		1740	8.4	.17	31
Korea, Rep. of	(1965)34.74 Won (3)	19.92	3260	167.5	.20	44
Laos	25.30 Kip	10.54	870	-	.62	0.01
Malaysia	NA		2370	20.0	.32	9
Nepal	"		1930	.3	.18	-
Pakistan	"		1720	3.6	.25	-
Philippines	0.329 Pesos	9.95	1240	9.4	.36	8
Thailand	0.680 Baht	3.40	1600	3.2	.36	17
Vietnam, Rep. of	NA		2020	26.5	.20	20
Other Countries						
Japan	(1965)100 Yen	27.80	5150	304.4	.06	56
Taiwan-China	NA		3650	237.1	.07	58
Australia	"		-	28.6	2.98	3
New Zealand	"		-	-	31	10
United Kingdom	"		-	199.9	.14	1
Canada	"		-	11.9	2.18	1
United States	(1965)10.8 Cents	10.80	4950	54.1	.96	[illegible]

(1) 1965 Production Year Book. Food and Agriculture Organization - United Nations. Figures computed from data for latest year reported (1964).

(2) Prices for average quality used; exchange rates for 1 U.S. Dollar, 1965 and 1966.
" Korea, Rep. of - 270 Won
" Thailand - 20 Baht
" Laos - 240 Kip
" Philippines - 3.90 Pesos

(3) Rural Development Project Evaluation Report-USOM/Korea-1966; reported 2983 Won per 100 liters; conversion factor; 1 Hectoliter = 1.804 Seck; 1 Seck = 100 kg. Paddy Rice.

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TABLE XII - C [d]

Philippines: Estimated Breakdown of Fertilizer Consumption in 1964 by Type of Fertilizer. [a]

(Metric Tons)

Type of Fertilizer	Total	Nitrogen Equivalent
Ammonium Sulphate	140,153	28,731
Urea	20,462	9,102
Mixed, 16-20-0	28,422	4,548
Mixed, 12-24-12	11,934	1,432
Mixed, 12-12-12	33,007	3,961
Other Nitrogenous [b]	7,264	946
Total nitrogenous fertilizers . . .	241,242	48,718
Other fertilizers	53,045	n.a.
Total fertilizers.	294,287 [c]	48,718

a/ Estimates based on sample survey made by the Esso Fertilizer and Chemical Company (Phils.) and reported in San Miguel Corporation, Market Research Department, The Fertilizer Industry of the Philippines (Manila, December 1965), Appendix D.

b/ Assumes average nitrogen content of 13 per cent.

c/ Estimated consumption of manufactured fertilizers derived from the Esso sample survey exceeded total imports and domestic production in 1964 by 10,000 tons, or 20 per cent of availability (exclusive of inventory changes). This discrepancy may be explained by the propensity of the farmers interviewed, to inflate their estimates of fertilizer used because they felt it would reflect credit on them as good farm managers. Assuming that all of the increment in irrigated acreage is planted to rice, and that recommended levels of fertilizer application for IR8 are applied to all irrigated rice plantings in Irrigation Projection I and II.

d/ Rice and People in 1990, Colay and Goodstein, Table 27, p. 127

D.98

TABLE XII-D

Philippines: Fertilizer Imports, 1955 - 1964a/ (metric tons)

	Nitrogenous	Phosphatic	Potassic	Others	Total
1955	70,515	20,530	47	16,992	108,08[illegible]
1956	37,295	14,441	5,516	10,727	67,97[illegible]
1957	69,031	49,568	14,717	24 899	158,215
1958	66 884	22,738	11,102	5,952	106,676
1959	128,793	33,283	18,343	10,046	199,465
1960	87,958	29,487	16,757	[illegible],272	139,47[illegible]
1961	94,890	42,617	33,894	8,413	179,814
1962	140,911	74,696	44,460	34 472	294,539
1963	41,956	12,644	13,831	4,224	72,655
1964	148,791	41,909	39,383	3,871	233,954

a/ Data provided by National Economic Council. See San Miguel Corporation, Market Research Department, The Fertilizer Industry of the Philippines (Manila, December 1965). Table 17, p. 40. Totals conform to data reported in Bureau of Census and Statistics, Foreign Trade Statistics of the Philippines.

Rice and People in 1990, Golay and Goodstein, Table 25, p. 125.

TABLE XII-E

Rated Capacity and Actual Production Per Kind of Fertilizer from 1960 to 1967 (Metric Tons) *

Company	Kind of Fertilizer	1965 Capacity	1965 Actual	1966 Capacity	1966 Actual	1967 Capacity	1967 Actual
Atlas	Ammonium Sulphate	-	-	90,000	7,412	90,000	46,014
	Complex Fertilizer	96,400	48,570	96,400	29,670	96,400	36,876
	Superphosphate	27,200	-	27,200	340	27,200	6,821
	Total	123,600	48,570	213,600	37,422	213,600	89,702
ChemPhil	Ammonium Sulphate	30,000	4,277	30,000	7,000	54,000	6,000
	Complex Fertilizer	9,000	1,000	12,000	6,000	12,000	5,000
	Superphosphate	15,000	2,000	15,000	2,400	15,000	1,000
	Total	54,000	7,277	57,000	15,400	81,000	12,000
ESPAC	Urea	-	-	67,000	20,000	67,000	50,000
	Complex Fertilizer	-	-	165,000	14,000	165,000	36,000
	Mixed Fertilizer	-	-	165,000	29,000	165,000	49,000
	Total			397,000	63,000	397,000	135,000
Maria Cristina	Ammonium Sulphate	59,400	44,365	59,400	24,947	59,400	40,426
	Agua Ammonia	-	-	-	-	64,349	8,447
	Total	59,400	44,365	59,400	24,947	123,749	48,873
General	Complex Fertilizer	-	-	-	-	81,000	1,200
	Total					81,000	1,200
	Grand Total	237,000	100,212	[illegible]	140,769	996,349	286,[illegible]

*Prepared by USAID-Philippines from figures from the Fertilizer Institute of the Philippines.

TABLE XXII. c/

TABLE XXII. Average price per bag paid by farmers for fertilizer purchased from private and government sources in 19 leading rice provinces, Philippines, 1968. a/

	$(NH_4)_2SO_4$ (1)	Urea (2)	12-12-12 (3)
Central Luzon			
Bulacan	13.80	24.40	16.20
Pampanga	12.00	21.90	17.00
Nueva Ecija	13.50	23.80	17.15
Tarlac	14.90	23.90	17.50
Pangasinan	14.10	24.45	17.25
Other			
Laguna	13.80	24.40	18.50
Cagayan	16.50	27.50	22.50
Ilocos Sur	14.40	25.16	20.75
Albay	16.50	25.50	18.25
Iloilo	13.20	22.50	17.00
Leyte	15.00	23.25	19.00
Cotabato	15.30	26.60	19.00
Government b/			
ACA	12.50	0	15.00

a/ All types of fertilizers are in 45 kg bags except urea which has 50 kg.

b/ Government prices are uniform throughout

c/ IRRI - Barker, 1968, Tale Table 13.

TABLE XXII - Appendix

TABLE XIV [a]

TABLE XIV. Distribution of fertilizer dealers by region and company, Philippines, 1968.

Region	USFAC	Atlas	Ma. Cristina	Chemphil	ACA	Total
1. Ilocos	23	35	31	11	7	107
2. Cagayan	32	13	13	20	6	84
3. Central Luzon	89	123	103	15	44	374
4. Southern Tagalog	61	75	99	9	19	263
5. Bicol	36	33	6	-	5	80
6. E. Visayas	24	86	4	-	11	125
7. W Visayas	47	32	14	2	11	106
8. N & E Mindanao	38	36	11	1	12	98
9. S & E Mindanao	53	71	24	2	15	165
Total	403	504	305	60	130	1,402

Total private fertilizer dealers: 1,272

Total ACA district fertilizer agents: 130

Source of basic data: Fertilizer Institute of the Philippines.

[a] IRRI - Barker, 1968, Table 12.

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TABLE XV

Kilograms of Paddy Rice Required to Purchase one Kilogram of Fertilizer Plant Nutrients at the Farm Level in Selected Countries 1/

Countries	Nitrogen (Kilograms of Rice)	Phosphate (P_2O_5) (Kilograms of Rice)	Potash (K_2O) (Kilograms of Rice)	Average
United Arab Republic	7.16	3.86	2.61	6.46
Taiwan-China	4.58	2.45	1.30	3.71
India	4.66	3.91	1.65	4.35
Japan	1.51	1.30	.56	1.16
Pakistan	1.76	1.27	.61	1.56
Philippines	3.20	2.56	1.42	2.50
Thailand	5.25	4.32	2.22	4.55
United States	2.42	1.83	.92	1.72
South Korea 2/	1.06	0.83	0.68	0.85

Consumption of Commercial Fertilizers
(1000 metric tons)

Country and Type	Average 1948/49-1952/53	Average 1952/53-1956/57	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67 3/	Average 1962/63-1966/67
Philippines									
Nitrogen	18	18	36	48	50	50	58	65	54
Phosphate	12	10	16	25	n.a.	25	30	41	30
Potash	3	5	27	32	n.a.	n.a.	50	55	45

1/ Except for South Korea all figures computed from Production Year Book 1965, Food and Agriculture Organization where U.N. figures are for 1964

2/ Computed from figures on polished rice and paddy prices in 1964 (3032 Won per Hectoliter [illegible] 72 Won per Kg.) in Rural Development Project Evaluation Report - USOM/Korea - 1967; and fertilizer (plant nutrients) Prices for 1966 shown in Report, Projected Fertilizer Needs for Korea, 1967-1981, TVA Fertilizer Consultant Team, 1965. N is mean 59.6 Won per kg.; P_2O_5 at 46.6 Won per kg.; (K_2O) at 38.01 per kg. (1964 prices).

3/ Preliminary.

n.a. not available

Sources: FAO Yea. Book, 1965

FAO, Bulletin of Agricultural Economics and Stat[illegible]s, February 1968.

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TABLE XVI

Philippines: Increments of Palay Output Attributable to "Modern Inputs" Needed to Meet Estimated Rice Requirements in 1990

	Low Rice Projection			
	Irrigation Projection I (000 MT, Palay)	Ratio	Irrigation Projection II (000 MT, Palay)	Ratio
Increment in palay required in 1990 over average annual production, 1964-1966	5,745	1.000	5,745	1.000
Increment in palay output attributable to expansion of geographic area under rice cultivation	1,210	.212	1,210	.212
Increment of palay output attributable to achievement of irrigation targets	1,274	.222	2,497	.437
Increment of palay output which must be provided by "modern inputs" in combination with irrigation targets	3,261	.566	2,038	.351
	5,745	1.000	5,745	1.000

	High Rice Projection			
	Irrigation Projection I		Irrigation Projection II	
Increment in palay required in 1990 over average annual production, 1964-1965	9,712	1.000	9,712	1.000
Increment in palay output attributable to expansion of geographic area under rice cultivation	1,210	.125	1,210	.125
Increment of palay output attributable to achievement of irrigation targets	1,274	.131	2,497	.257
Increment of palay output which must be provided by modern inputs in combination with irrigation targets	7,228	.744	6,005	.618
	9,712	1.000	9,712	1.000

Source:

Rice and People in 1990; Golay & Goodstein, Table 23, p. 119

TABLE XVI

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TABLE [illegible] a/

Philippines: Estimated Nitrogenous Fertilizer Requirements in 1990 for the Production of Improved Rice Varieties on the Area Irrigated under Irrigation Projections I and II

Season	Average Irrigated Area Harvested, Crop Years 1964-1966 a/ (Ha.)	Increment in Irrigated Area (Hectares) Projection I b/	Increment in Irrigated Area (Hectares) Projection II c/	Estimated Irrigated Area Harvested, 1990 Projection I	Estimated Irrigated Area Harvested, 1990 Projection II	Fertilizer Input Per Hectare d/ (Mt. Nitrogen Equivalent)	Total Fertilizer Requirements (Mt Nitrogen Equiva Projection I	Total Fertilizer Requirements (Mt Nitrogen Equiva Projection II
Wet . . .	661,800	1,230,000	1,630,000	1,891,800	2,291,800	.070	132,426	160,426
Dry . . .	287,700	457,500	948,000	745,200	1,235,700	.100	74,520	123,570
Combined	949,500	1,687,500	2,578,000	2,637,000	3,526,500		206,946	283,99

a/ DANR estimates. Republished in International Rice Research Institute, Department of Agricultural Economics, Compilation of Statistical Data, Rice, Table 10.
b/ See Table 18.
c/ See Table 20.
d/ Rice Information Cooperative Effort. Rice Production Manual. University of the Philippines, College of Agriculture, Los Baños, 1967. p. 180
e/ "Rice and People in 1990". Coley and Goodwin. Table 24. p. 126

TABLE XVIII c/

The change in cost and return associated with a 30 kg increase in fertilizer level, IR8, Maligaya Rice Research and Training Center, 1966 wet season. a/

N-applied (1) (kg/ha)	Grain yield (2) (kg/ha)	Return from fertilizer (3) (P)	Cost of fertilizer (4) (P)	Net return from fertilizer (5) (P)	Added return (6) (P)	Added cost (7) (P)	Marginal benefit-(col.6 ÷ col. 7) (8)
0	3060.7	0	0	0	0	0	0
30	4542.2	444.45	35.40	409.50	444.45	35.40	12.6
60	5577.3	754.99	70.80	684.19	310.54	35.40	8.8
90	6166.0	931.61	114.70	816.91	176.62	35.40	5.0
120	6308.3	974.27	141.60	832.67	42.66	35.40	1.2

a/ Based on: $Y = 3060.7 + 56.823 N - .248 N^2$.

Rough rice = P0.36/kg. N = P1.18/kg N from urea.

b/ Include deduction for cost for harvesting increased production due to N application.

c/ IRRI - Report for 1967, Table 8, page 18.

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TABLE XIX[b/]

PHYSICAL, ECONOMIC, AND SOCIOLOGICAL FACTORS RELATED TO THE TIME OF ADOPTION OF NEW RICE VARIETIES AMONG 155 FARMERS IN LAGUNA, 1966 TO 1968

Factors	Time of first adoption				
	1966	1967		1968	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season
No. of new adopters	6	17	88	20	15
Physical factors - wet season					
Percent farms irrigated (%)	100	92	80	45	67
Area planted - 1967 (ha)	1.8	2.0	2.4	2.5	2.6
Area new varieties - 1967 (ha)	1.2	1.5	1.8	0	0
Yield 1966 - actual (kg/ha)	2860	2816	2464	1936	2376
Yield 1967 - expected (kg/ha)	4884	4928	4092	3256	3124
actual (kg/ha)	4532	4356	3300	2200	2200
Yield 1968 - expected (kg/ha)	4356	4136	3740	3168	2948
actual (kg/ha)	3652	3696	3380	2332	2640
Economic factors - wet season					
Variable costs[a/] - 1966 (₱/ha)	347	314	259	239	260
Variable costs[a/] - 1967 (₱/ha)	515	472	379	290	314
Price rough rice - 1966 (₱/kg)	0.41	0.41	0.41	0.41	0.39
Price rough rice - 1967 (₱/kg)	0.39	0.41	0.39	0.50	0.50
Price rough rice - 1968 (₱/kg)	0.36	0.41	0.34	0.34	0.32
Return to variable costs - 1966 (₱/ha)	826	841	751	555	667
Return to variable costs - 1967 (₱/ha)	1253	1314	908	810	786
Sociological factors					
Contact with extension (no.)	11	9	4	2	5
Education (grades)	5	4	4	2	2
Age (years)	48	53	44	49	48

a/ Variable costs include cash costs plus harvester's share and amount withheld for seed. $1.00 = ₱3.90.

b/ IRRI - Barker, 1968 Table I.

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TABLE XX [b/]

Physical, economic, and sociological factors related to the degree of adoption of new varieties among 155 farmers in Laguna, 1967 wet season.

Factors	Full adopters 100 percent	Partial adopters (48 percent)	Non-adopters (zero percent)
No. of farms	60	48	47
Physical Factors			
Percent of farms irrigated (%)	93	79	69
Area planted (ha)	2.4	2.4	2.4
Area new varieties (ha)	2.4	1.2	0
Yield 1966 - actual (kg/ha)	2684	2552	2288
Yield 1967 - expected (kg/ha)	4796	4048	3212
actual (kg/ha)	4224	3256	2112
Economic Factors			
Variable costs - 1966 (₱/ha) [a/]	296	261	253
Variable costs - 1967 (₱/ha) [a/]	440	418	313
Price rough rice - 1966 (₱/kg)	0.41	0.41	0.41
Price rough rice - 1967 (₱/kg)	0.32	0.41	0.48
Price rough rice - 1968 (₱/kg)	0.34	0.34	0.36
Return to variable costs - 1966 (₱/ha)	804	785	685
Return to variable costs - 1967 (₱/ha)	912	917	701
Sociological Factors			
Contact with extension (no.)	6	3	3
Education (grades)	5	4	2
Age (years)	44	45	44

a/ Variable costs include cash costs plus harvester's share and amount withheld for seed. $1.00 = ₱3.90.

b/ IRRI - Barker, 1968 - Table 2

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TABLE XXI [a]

RETURNS AND COSTS PER HECTARE OF ROUGH RICE FOR IR-8 AND MALAGKIT VARIETIES ON 60 FARMS IN LAGUNA, 1968 WET SEASON

Items	Full adopter		Non-adopter		Partial adopter	
	IR8		Malagkit		IR8	Malagkit
No. of farms	30		15		15	15
Physical inputs						
Average area of varieties (Ha/farm)	2.4		1.6		1.0	1.0
Nitrogen (kg/ha)	78		56		79	68
Labor (man-days/ha)	69		58		72	68
Cash costs						
Fertilizer expenses (P/ha)	92		63		95	76
Insecticides expenses (P/ha)	24		11		25	11
Weedicides expenses (P/ha)	10		7		10	8
Yield of rough rice in:						
Kg/ha	3696		2816		4004	2904
Cavans/ha	84		64		91	68
Standard deviation (cav/ha)	17		19		17	23
Price of rough rice						
P/kg	0.28		0.53		0.28	0.53
P/cavan	12.50		23.50		12.50	23.50
Variable costs (P/ha)	475		458		494	484
Return over variable costs (P/ha)	575		1046		644	1114

a/ IRRI, Barker + 1968, Table 3.

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TABLE XXII c/

RETURNS AND COSTS PER HECTARE OF ROUGH RICE a/
FOR SELECTED VARIETIES, RIZAL, 1967 WET SEASON

Items	IR8	BPI-76	Intan
No. of farms	102	26	38
Physical inputs			
Average area of variety (ha/farm)	0.82	0.80	1.07
Cash costs and costs in kind			
Fertilizer (₱/ha)	62	20	26
Chemicals (₱/ha)	15	3	6
Other costs (₱/ha)			
Land preparation	52	58	30
Pulling of seedlings	26	16	25
Transplanting	43	38	45
Weeding	16	25	7
Harvesting, threshing & seeds	303	165	192
Total	517	325	331
Yield of rough rice in:			
Kg/ha	3608	2772	2820
Cavans/ha	82	63	64
Standard deviation (cav/ha)	57	42	32
Price of rough rice b/			
₱/kg	0.28	0.35	0.35
₱/cav	12.34	15.43	15.43
Return over variable cost (₱/ha)	495	647	657

a/ These data are summarized from records provided by the Agricultural Development Mill of Rizal.

b/ Prices used are based upon Bureau of Agricultural Economics prices received by farmers for ordinary rough rice, Nov.-Dec., 1967. Price of IR8 is reduced by 20%.

c/ IRRI - Barker - 1968, Table 4.

TABLE XXIII c/

RETURNS AND COSTS PER HECTARE OF ROUGH RICE FOR SELECTED VARIETIES, RIZAL, 1968 DRY SEASON a/

Items	IR8	IR5	C_4	Binato
No. of farms	179	16	93	40
Physical inputs				
Average area of variety (ha/farm)	.70	.60	.89	.60
Cash costs and costs in kind				
Fertilizer (P/ha)	89	138	103	35
Chemicals (P/ha)	18	28	25	14
Other cash costs (P/ha)				
Land preparation	50	45	56	26
Pulling of seedlings	23	13	21	14
Weeding	31	11	23	9
Transplanting	49	46	52	34
Harvesting, threshing, & seeds	267	347	274	210
Total	527	628	554	342
Yield of rough rice in:				
Kg/ha	4660	7130	4310	3920
Cavans /ha	106	162	98	89
Standard deviation (cav/ha)	71	86	60	40
Price of rough rice b/				
P/kg	0.29	0.33	0.36	0.29
P/cav	12.83	14.44	16.04	12.83
Return over variable cost (P/ha)	833	1711	1018	800

a/ These data are summarized from survey records provided by the Agricultural Development Council of Rizal.

b/ Prices used are based upon Bureau of Agricultural Economics prices received by farmers for ordinary rough rice, March-April, 1968. Price of IR5 is reduced by 10%, and price of IR8 and Binato by 20%.

c/ IRRI - Barker, 1968, Table 5.

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TABLE XXIV b/

COMPARISON OF MANILA'S CONSUMER PRICE INDEX AND CONSUMER, RICE PRICE INDEX (1955 = 100)

	Consumer Price Index a/	Consumer Rice Price Index
1960		
January	109.6	97.2
April	108.7	98.0
July	112.9	105.4
October	115.2	126.4
1961		
January	111.1	122.4
April	109.3	123.0
July	112.6	125.1
October	116.1	110.4
1962		
January	116.2	107.0
April	117.6	108.3
July	120.2	115.6
October	123.9	118.8
1963		
January	123.0	118.2
April	122.3	123.0
July	126.5	128.2
October	130.4	154.6
1964		
January	131.3	150.0
April	129.8	159.2
July	135.2	177.0
October	136.9	161.7
1965		
January	141.2	150.7
April	134.6	154.0
July	13999	155.2
October	139.1	162.9
1966		
January	142.7	166.8
April	140.4	170.2
July	144.2	185.2
August	146.8	198.9

a/ Excluding Rice.

Source: Unpublished papers of Leon A. Mears, School of Economics, University of the Philippines Diliman, Quezon City; source of basic data: Central Bank of the Philippines, Manila.

b/ Storage, Handling & Marketing of Selected Crops inthe Philippines, Weitz-Hettelsater Engineers, 1968, Table 33, p. 113

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TABLE XXIV-A

COMPARISON OF MANILA CONSUMERS' PRICE INDEX
WITH THE MANILA CONSUMERS' RICE INDEX
(1955 = 100)

	Consumer Price Index	Consumer Rice Index
1966		
September	147.[illegible]	220.6
October	145.8	224.1
November	143.6	221.8
December	149.0	212.0
1967		
January	150.4	210.7
February	151.3	218.1
March	147.6	201.7
April	143.0	201.8
May	143.5	202.5
June	146.4	213.0
July	147.8	218.4
August	150.4	218.4
September	153.3	218.4
October	155.9	218.4
November	160.5	215.1
December	160.7	211.3
1968		
January	154.4	201.5
February	151.5	194.2
March	150.7	191.6
April	150.2	191.1
May	150.8	189.6
June	152.8	189.8

Source: Unpublished papers of Leon A. Mears, School of Economics, University of the Philippines, Diliman, Quezon City; source of basic data: Central Bank of the Philippines, Manila.

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Month	Whlse. Prices (1965 = 100)			Cost of Living (1965 = 100)			Money Wages (1965 = 100)			Real Wages (1965 = 100)			Bancom Rate (in %)			Com'l & Indust'l Share Prices (1965 = 100)		
	1966	1967	1968	1966	1967	1968	1966	1967	1968	1966	1967	1968	1966	1967	1968	1966	1967	1968
JaJan.	104	108	114	103	112	114	106	108	118	102	97	104	12 0	10.2	11.4	105	109	161
Feb.	104	109	114	102	113	111	106	108	118	103	96	106	10.6	10.3	11.6	104	115	166
March	103	108	114	102	109	111	106	109	118	105	99	106	11.1	9.9	12.3	101	124	168
April	104	108	113	102	106	110	107	110	124	104	104	112	10.3	10.3	12.9	98	125	166
May	105	109	113	104	107	110	106	110	124	103	103	[illegible]	9.9	11.0	13.4	100	133	165
June	107	109	112	107	109	111	107	110	124	100	101	[illegible]	10.2	11.4	13.5	101	130	167
July	106	110	111	106	111	112	108	115	129	102	103	115	10.5	12.1	13.8	99	123	164
Aug.	107	111	113	106	112	113	108	115	129	101	102	114	10.1	11.7	13.6	100	129	165
Sept.	109	112	113	111	114	115	108	115	129	97	101	112	10.1	11.5	14.2	101	130	172
OcOct.	108	113	109	110	116	116	109	115		99	99		10.5	11.2	14.1	101	134	178
Nov.	107	115	113	110	119	115	109	116		99	98		10.7	11.8	14.0	106	141	186
Dec.	107	118	114	111	118	114	108	116		98	99		11.0	12.0	13.7	108	144	192
Qtr.																		
I	103	109	114	103	111	112	106	109	118	103	97	105	11.2	10.1	11.8	103	116	165
II	105	109	113	104	108	111	07	110	124	102	103	112	10.1	10.9	13.3	100	129	166
III	107	111	112	108	113	113	108	115	129	100	102	114	10.2	11.8	13.9	100	128	167
IV	108	115	112	110	118	115	109	116		99	98		10.7	11.7	13.9	105	139	185
Cal. Yr.																		
1968	113			113									13.2			171		
1967	111			112			112			100			11.1			128		
1966	106			106			107			101			10.6			102		
1965	100			100			100			100						100		
1964	97			98			93			96						106		
1963	91			90			90			103						115		

Dry

TABLE XXVI [e]

Philippines. "Low" Projection of Rice Requirements, 1970-1990

Year	(1) Est. Population (as of June 30)[a] 000	(2) Projected Aggregate Milled Rice Requirement[b] MT	(3) Projected Aggregate Palay Prod. Required[c] MT	Index 1964-66 = 100	(4) Increment in Palay Production Required Over Average Annual Output of Palay, 1964-66 MT	(5) Average Annual Increment in Palay Production Required MT
1970	37,852	3,142,000	5,197,000	130.9	1,227,000	245,000[d]
1975	44,397	3,685,000	6,096,000	153.6	2,126,000	180,000
1980	52,016	4,317,000	7,142,000	179.9	3,172,000	209,000
1985	60,820	5,048,000	8,351,000	210.4	4,381,000	242,000
1990	70,536	5,854,000	9,685,000	246.0	5,715,000	267,000

a/ F. W. Lorimer, "Analysis and Projections of the Population of the Philippines," in First Conference on Population (Proceedings of the Conference sponsored by the Population Institute of the University of the Philippines, Quezon City 1966), p. 301, (Hyphothesis C) Lorimer's estimates, which are as of February 15, have been adjusted to mid-year by interpolation.

b/ Col. (1) multiplied by 83.0 kg., which is the average apparent per capita direct consumption of milled rice during 1949-64. (For the underlying data see Appendix Table A6).

c/ Metric tonnage equal to Col. (3) divided by 0.6048. (For derivation of this conversion factor, see note b. Table A5. Estimated average annual palay production for crop years 1964-1966 equalled 3,940,000 tons.

d/ Refers to 1965-70 average.

e/ Rice and People in 1990, Golay and Goodstein Table II, p. 39.

TABLE XXVI

TABLE XXVII [e]

Philippines: "High" Projection of Rice Requirements, 1970-1990

	(1)	(2)	(3)	(4)		(5)	(6)
	Estimated Population (As of June 30) [a]	Projected Aggregate Cereal Requirements [b]	Projected Aggregate Milled Rice Requirements [c]	Projected Aggregate Palay Production Required [d]		Increment in Palay Production Required Over Average Annual Output of Palay, 1964-1966	Average Amount Increment In Palay Production Required
YEAR	000	MT	MT	MT	Index 1964-66 = 100	MT	MT
1970	38,162	4,274,000	3,200,000	5,294,000	133.4	1,324,000	265,000 [e]
1975	45,372	5,172,000	4,099,000	6,780,000	170.8	2,810,000	297,000
1980	54,138	6,280,000	5 206,000	8,613,000	217.0	4,643,000	366,000
1985	64,783	7,644,000	6,571,000	10,870,000	273.8	6,900,000	451,000
1990	77,721	9,327,000	8,253,000	13,652,000	346.0	9,682.000	557,000

a/ Lorimer, p. 301 (Hypothesis A) adjusted to mid-year.

b/ For 1970, Col. (1) multiplied by 112.0 kg., which is the average apparent per capita direct absorption of milled rice, wheat flour equivalent and milled corn equivalent combined during 1949-64. (For the underlying data, see Appendix Tables A12 and A13. Starting with 1975, it is assumed that the per cereal requirement increases by 2.0 Kg. every five years and that in 1990 the intake equals the recommended nutritional level per capita of 120.0 Kg.

c/ Col. (2) minus the apparent aggregate direct absorption of wheat flour equivalent and milled corn equivalent combined for 1965, which amounted to 1,073,687 metric tons. (See Appendix Tables A8 and A10.).

d/ Metric tonnage equal to Col. (3) divided by 0.6045. (For derivation of this conversion factor, see Note D, Table A6).

e/ Refers to 1965-70 average.

f/ Rice and People in 1990, Golay and Goodstein, Table 12, p. 41.

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TABLE XXVIII c/

Philippines: Summary Table

	Low Projection of Rice Requirements		High Production of Rice Requirements	
Rice requirements in 1990, (MT, palay)	9,685,000		13,652,000	
Average annual palay production, 1964-1966 (MT)	3,940,000		3,940,000	
Increment of palay production required, mid-1960s to 1990 (MT)	5,745,000		9,712,000	
	Irrigation Projection I	Irrigation Projection II	Irrigation Projection I	Irrigation Projection II
Increment of palay output attributable to in geographic area planted to rice (MT)..	1,210,000	1,210,000	1,210,000	1,210,000
Increment of palay output attributable to expansion in irrigated area planted to rice (MT)	1,274,000	2,497,000	1,274,000	2,497,000
"Gap" to be filled by modern inputs; new varieties, fertiliser agricultural chemicals, and so forth (MT)	3,261,000	2,038,000	7,228,000	6,005,000
	5,745,000	5,745,000	9,712,000	9,712,000
	Irrigation Projection I	Irrigation Projection II	Irrigation Projection I	Irrigation Projection II
Average yield increment from irrigated rice plantings in 1990, necessary to meet estimated rice requirements in 1990a/ (Kg. of palay per hectare)	1,237	578	2,741	1,702
Average yield increment from rainfed and irrigated plantings of lowland rice in mid 1960s necessary to meet estimated rice requirements in 1990b/ (kg. of palay per hectare)	1,807	1,807	3,388	3,388

a/ For details of calculations see p. 100

b/ Increase in average yield (from plantings equivalent to rainfed and irrigated plantings in crop years 1964-1966) over average annual yields from such plantings in 1964-1966 necessary to meet required increment in palay production under alternative estimates of rice requirements in 1990. Assumes that output increments attributable to additional land brought under cultivation are realized, but no irrigation development takes place. For average annual plantings of lowland rice and yields in 1964, see Table 15.

c/ Rice and People in 1990, Golay and Goodstein, Table 6, p. 9.

TABLE XXIX a/

Philippines: Summary of Irrigation Development in Irrigation Projections I and II, 1965-1990

	1990 Irrigation Projection I	1990 Irrigation Projection II
Increment of area planted, irrigated, first crop, palay (has.)	1,230,000	1,630,000
Increment of area planted, irrigated, second crop, palay (has.)	457,500	947,500
Estimated capital cost exclusive of interest charges of irrigation facilities (₱ Million)	1,962	7,520
Increment of output, irrigated, first crop, lowland palay (MT)	615,000	873,000
Increment of output, irrigated, second crop, lowland palay (MT)	658,572	1,623,572
Total increment of output attributable to irrigation targets	1,273,572	2,496,572
Estimated increment in palay requirements, Low Rice Projection (MT)	5,745,000	5,745,000
Estimated increment in palay requirements, High Rice Projection (MT)	9,712,000	9,712,000
Ratio of increment of output attributable to irrigation targets to "Low" rice requirements	.222	.437
Ratio of increment of output attributable to irrigation targets to "High" rice requirements	.131	.257

a/ Rice and People in 1990, Golay and Goodstein, Table 16, p. 80

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TABLE XXX

Philippines: Estimated Costs of Development of Gravity and Pump Irrigation in Irrigation Projection I

	First 500,000 hectares added to irrigation system	Second 500,000 hectares added to irrigation system	Third 500,000 hectares added to irrigation system	Cumulative Totals
Increment of design area in private irrigation systems a/	50,000	50,000	50,000	150,000
Increment of design area in NIA and communal gravity irrigation targets (has.)	300,000	300,000	300,000	900,000
Estimated cost per hectare of additional design area, NIA and communal gravity irrigation targets (P, 1965 prices).	820	1,640	2,460	1,640 b/
Estimated total cost of increment of design area in NIA and communal gravity irrigation targets (P million).	246	492	738	1,476
Increment of design area in ISU pump irrigation targets (has.)	150,000	150,000	150,000	450,000
Estimated cost per hectare of additional design area in ISU pump irrigation targets (P, 1965 prices)	540	1,080	1,620	1,080 b/
Estimated total cost of increment of design area in ISU pump irrigation targets (P million)	81	162	243	486
Estimated total cost to national government of combined increments of design area in NIA, communal and ISU irrigation targets (P million)	327	654	981	1,962

a/ Increment of area served by private irrigation is assumed to incur no capital cost to the national government.

b/ Average cost per hectare of design area of NIA and ISU projects respectively. Rice and People in 1990, Golay and Goodstein, Table 17, p. 84.

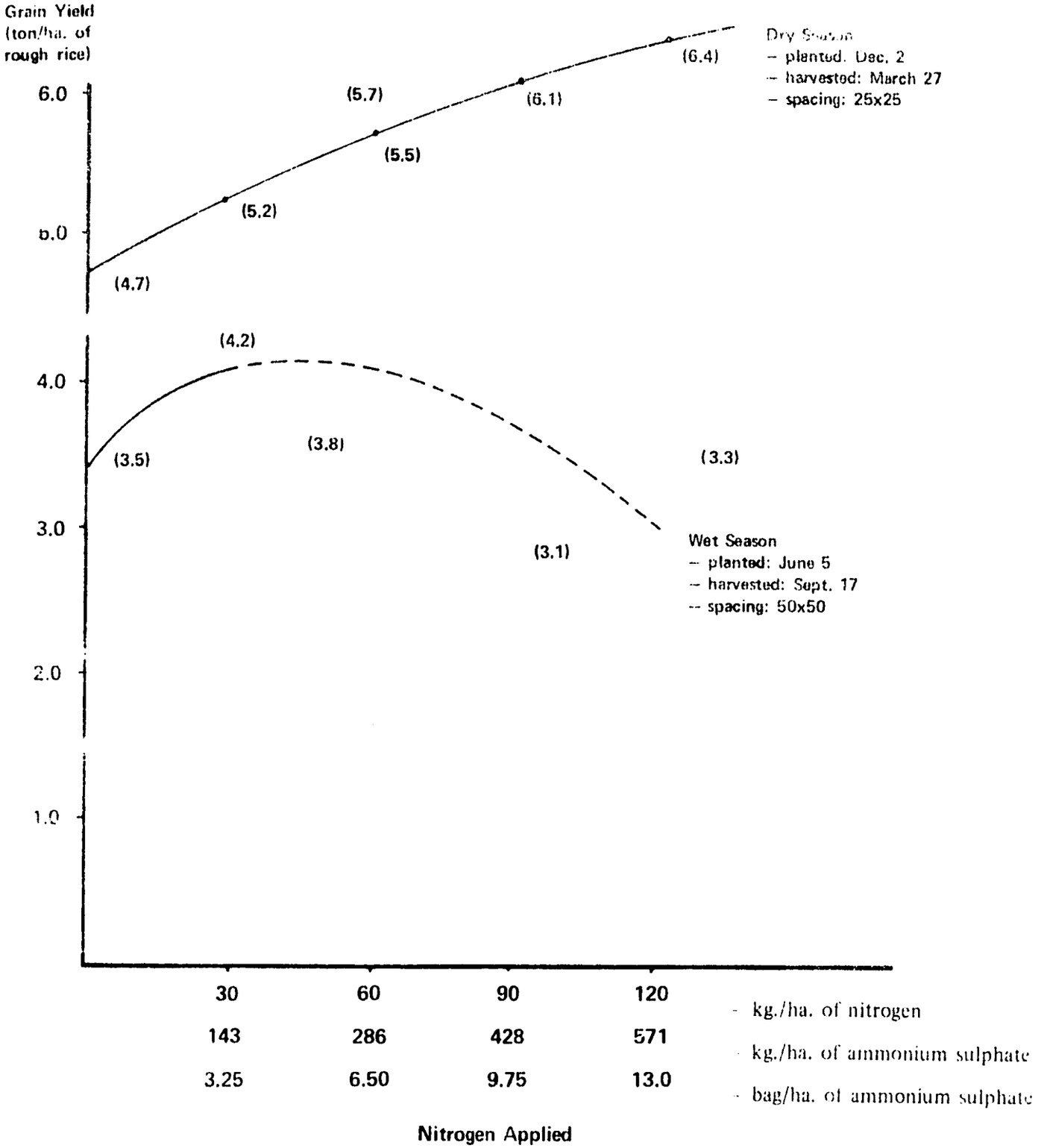
TABLE XXXI

ALLOCATION OF FUNDS OF THE RCPCC PROGRAM IN (000) PESOS

Phase of Program	Special RCPCC Fund FY 67	Special RCPCC Fund FY 68	NEC-USAID Budget FY 67	NEC-USAID Budget FY 68	TOTAL FYs 67-68
1. Research					
UPCA	643	1,405			2,048
BPI	1,000				1,000
2. Production & Distribution Certified Seeds	(1,338) 1/	(2,984)			4,322
3. Control of Pests and Diseases	2,391	2,432			4,823
4. Soil Management 2/	1,087	1,127			2,214
5. Procurement & Distribution of Fertilizers-ACA	3,253				3,253
6. Multi-Purpose Pavement-PACD	1,200	1,200			2,400
7. Mechanical Dryers (Research & Tests)	1,814	(1,898)			3,712
8. Special Rice Production and Extension Projects	602	649	150	348	1,749
9. Special Irrigation Projects 3/	150	150			300
10. Supervised Credit Funds CB & ACA	(34,000)	(62,705)			96,705
11. Management Audit			100	75	175
12. Survey & Evaluation BAE & RCPCC		12	210	130	352
13. Training & Evaluation		237	390	606	1,233
14. Applied Research & Demonstrational Plots		1,596	50	89	1,735
15. Seed Certification		995			995
16. Paddy Procurement Fund 4/		(142,750)			142,750
17 Special Travel Expense Fund			527	725	1,252
TOTAL	47,478	220,140	1,427	1,973	271,018 5/

1/ Figures in parenthesis ( ) recoverable.
2/ Includes soil analysis, construction and/or repair of soil laboratories and soil surveys.
3/ See sector on irrigation for regular irrigation budget.
4/ Figure not available for FY 1967.
5/ P248,675 theoretically recoverable.
6/ USAID and RCPCC Records

FIGURE 1*
YIELD OF PETA AT IRRI IN THE 1963 DRY AND WET SEASONS



Source. Based on data reported by A. Tanaka in IRRI 1963 Annual Report. Los Banos, Laguna, January 1964, p. 48.

*"Tenure and Productivity of Philippine Rice Producing Farms", by Vernon W. Rutton, a Draft Manuscript (65-2 Multilith), University of Minn., Dept. of Agricultural Economics, Nov. 20, 1965, p.

FIGURE 2*

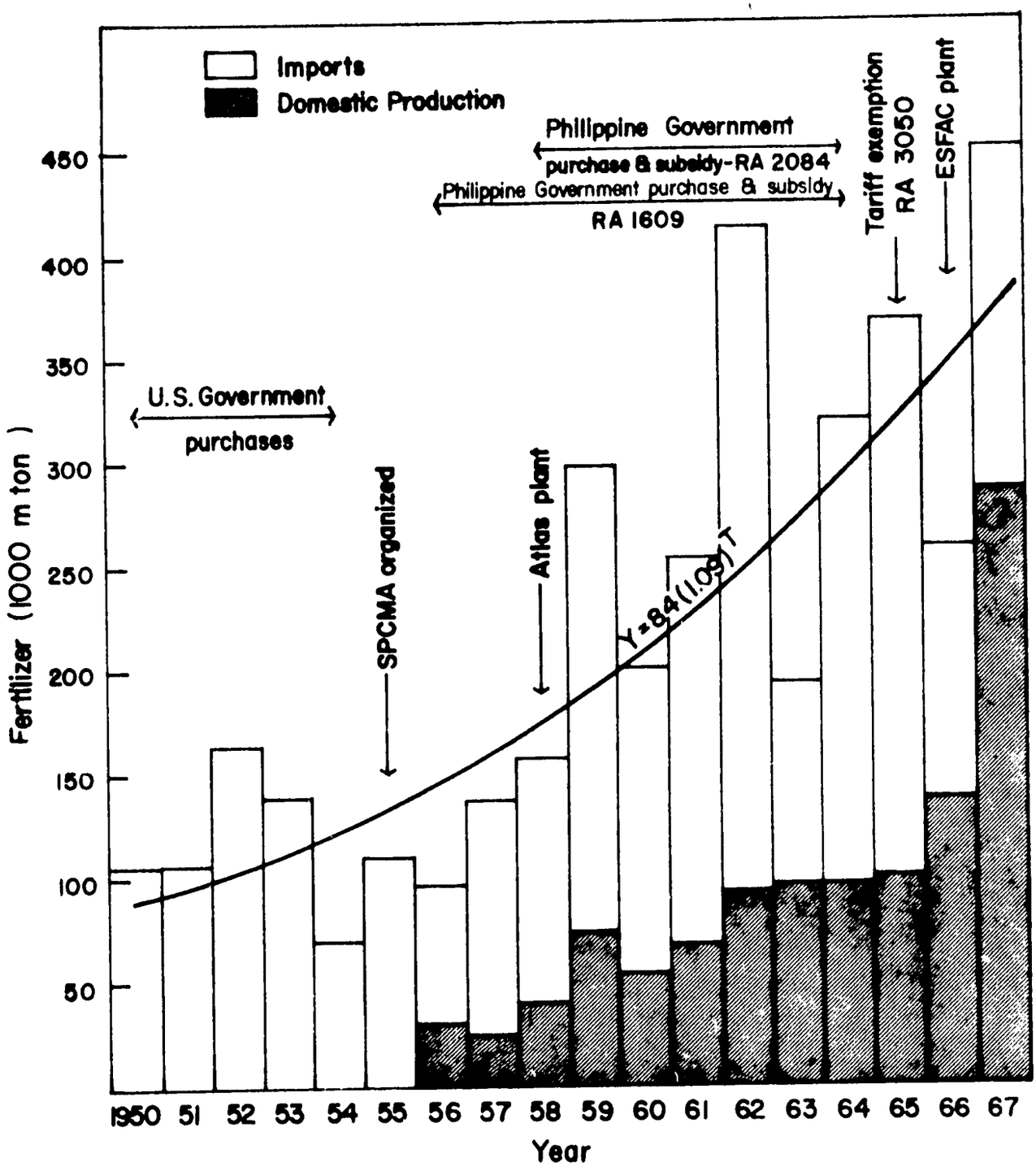


FIG 2 -- Total imports plus domestic production of inorganic fertilizer, Philippines, 1950-1967.

Agricultural Economics, Annual Report for1968, IRRI (by Randolph Barker), Los Banos. Figure 7.

D7

APPENDIX P.46

FIGURE 2

FIGURE 3*

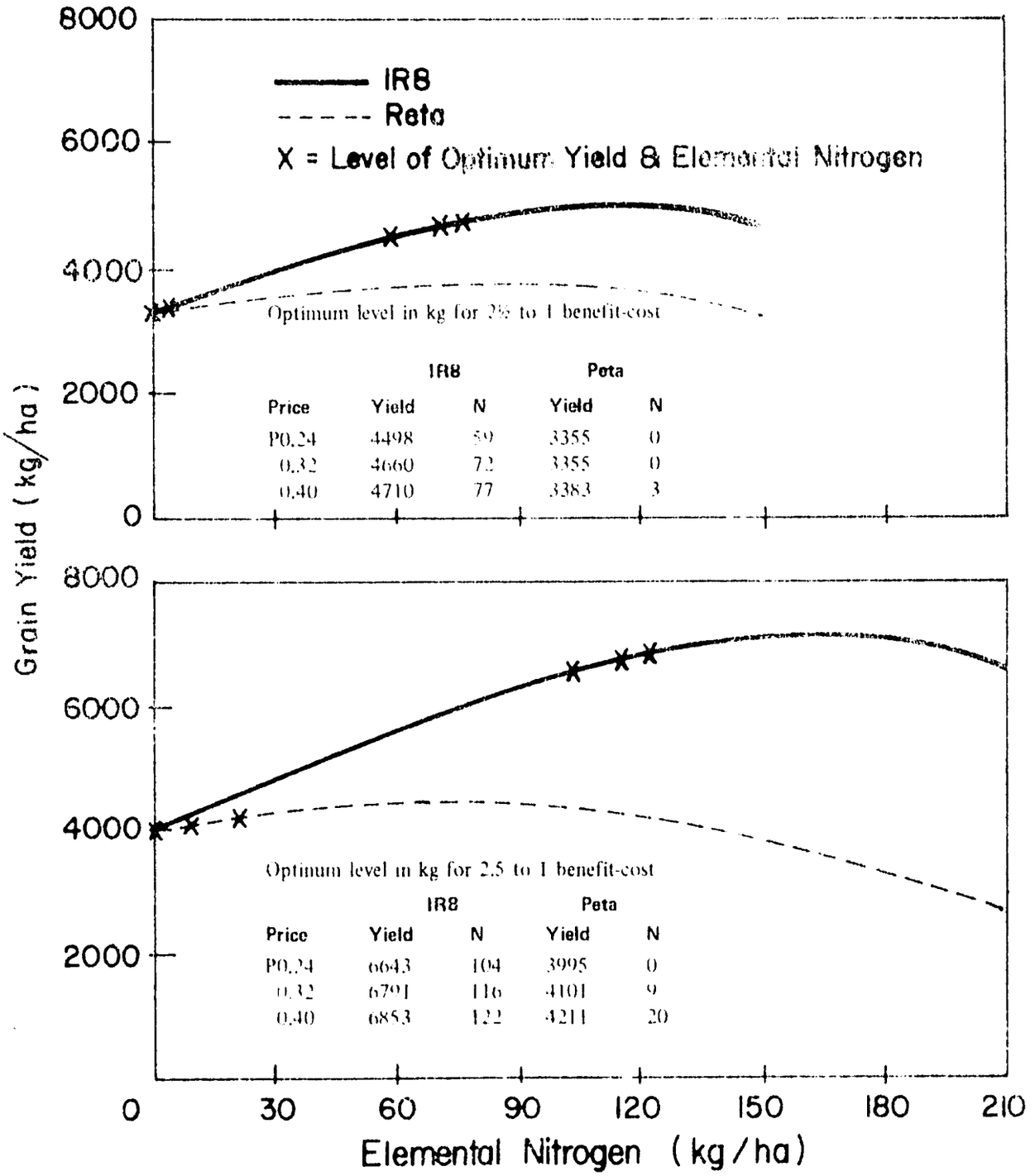


FIG. 3: a. Variability in optimum level of nitrogen and yield output level due to price effect. Maligaya 1966, 1967 and 1968 wet seasons. Observations combined.

b. Variability in optimum level of nitrogen and yield output level due to price effect. Maligaya, 1966, 1967 and 1968 dry seasons. Observations combined.

c. Research Review, Agricultural Economics, draft section for Annual Report, IRRI 1968, by Randolph Barker, dated January 31, 1969.

FIGURE 4

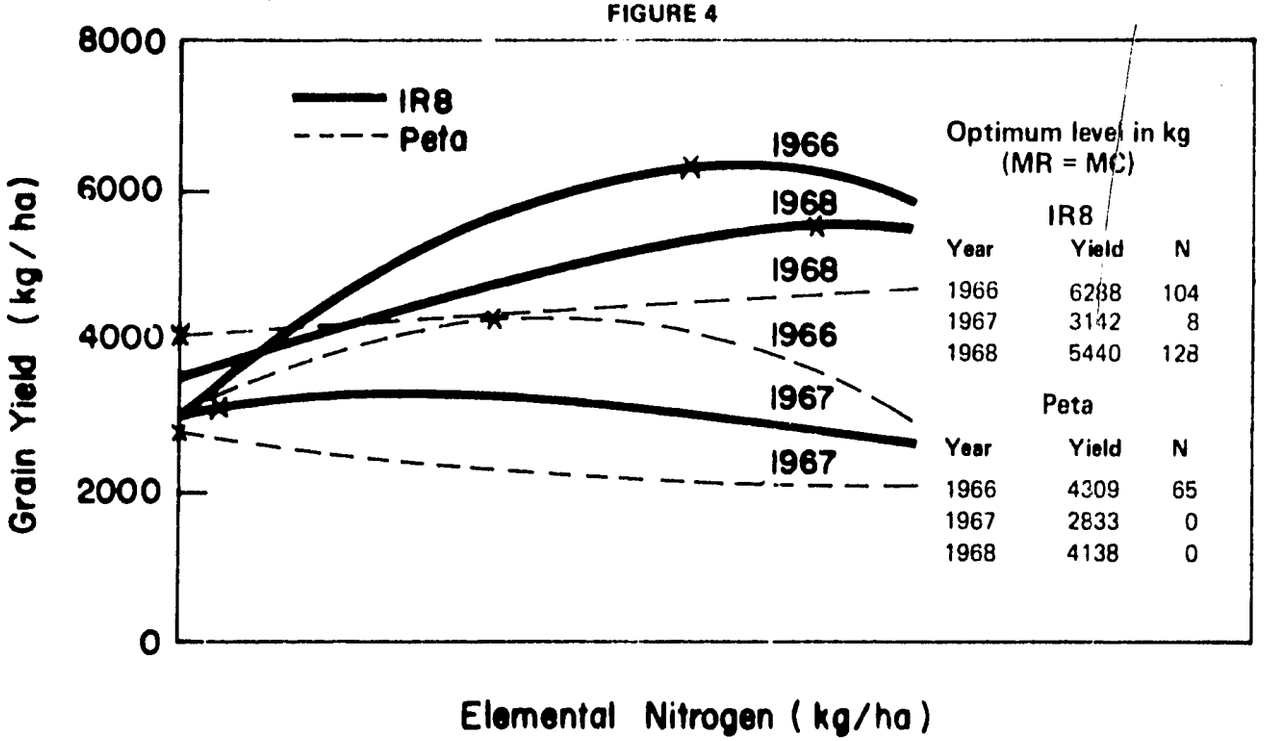


FIGURE 4*—Variability in optimum level of nitrogen and yield output due to yield effect, Maligaya, 1966, 1967 and 1968 wet seasons.

FIGURE 5

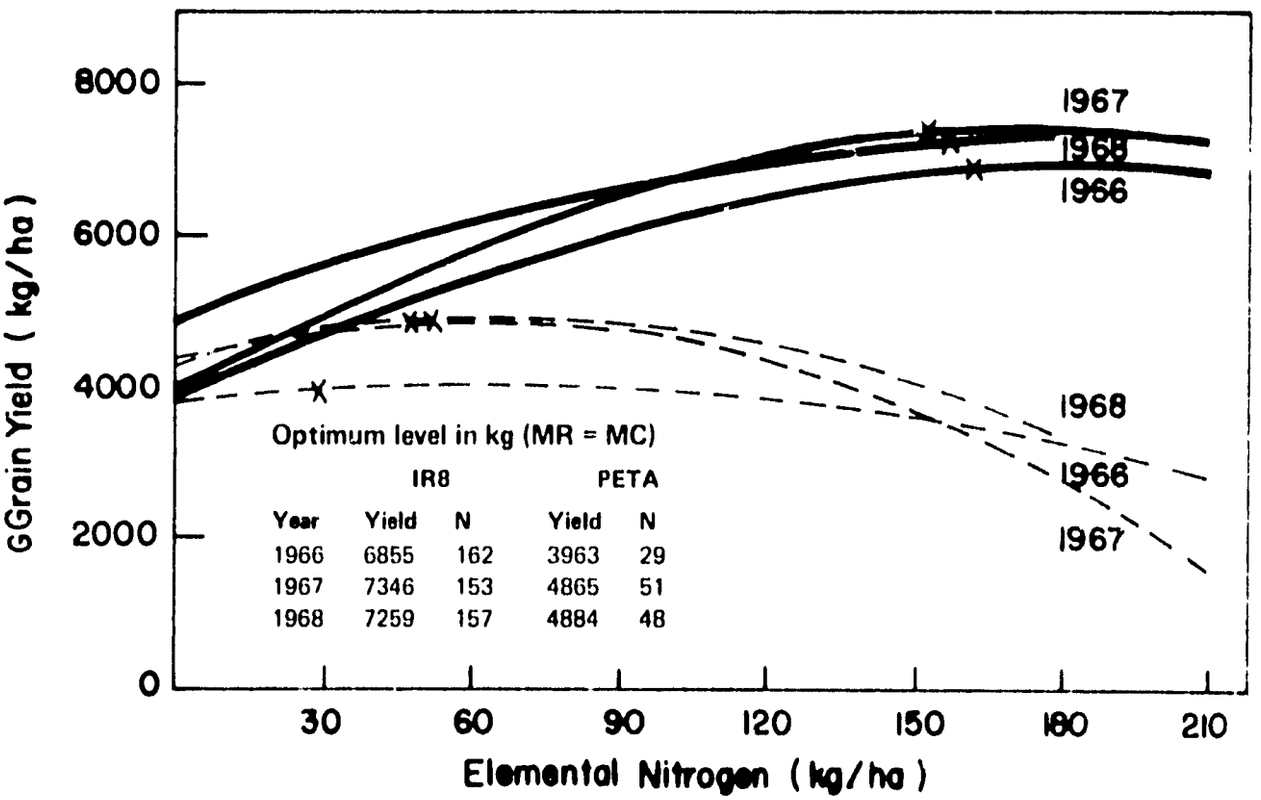


FIGURE 5*—Variability in optimum level of nitrogen and yield output due to yield effect, Maligaya, 1966, 1967 and 1968 dry seasons.

*Research Review, Agricultural Economics, draft section for Annual Report, IRRI 1968, by Randolph Barker, dated January 31, 1969.

FIGURE 6*

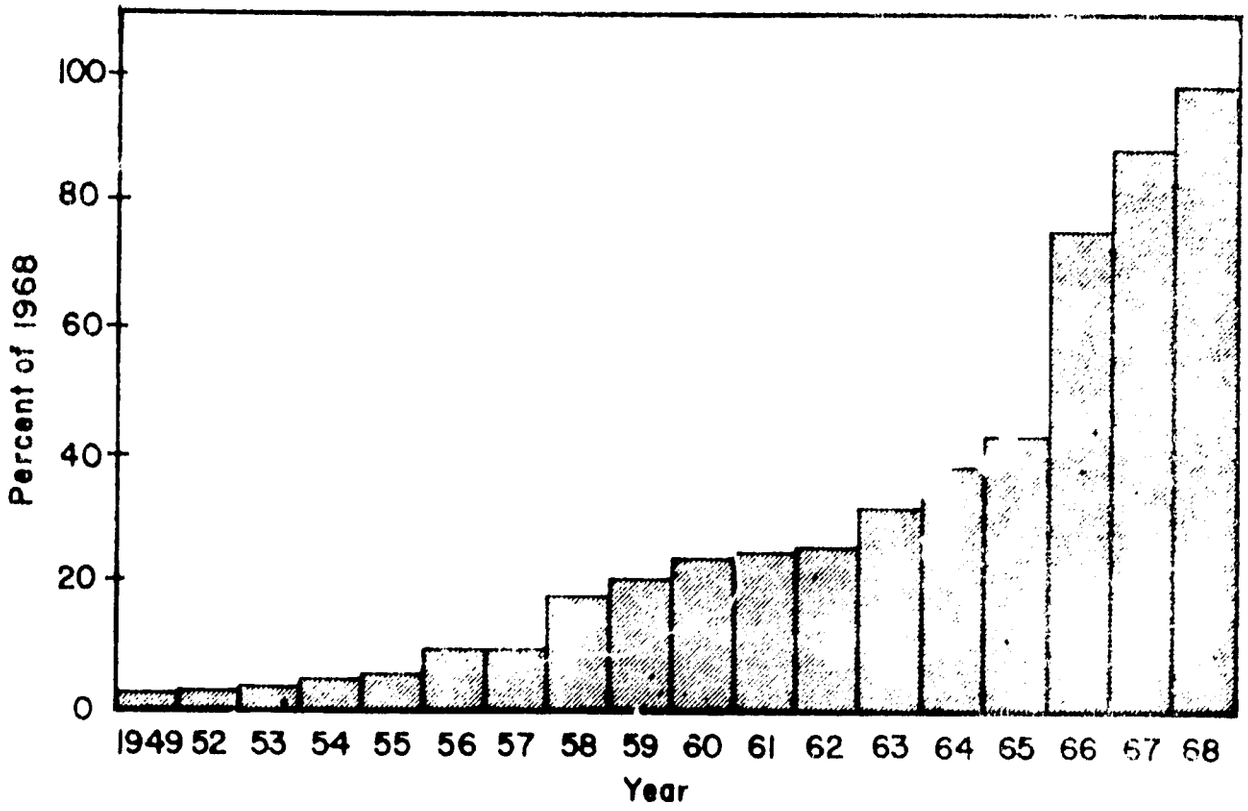


FIG. 6 — Growth of fertilizer dealers in 12 major rice producing provinces, Philippines, 1949 to 1968.

*Research Review, Agricultural Economics, draft section for Annual Report, IRRI 1968, by Randolph Barker, dated January 31, 1969.

FIG.6

CYCLICAL AND IRREGULAR VARIATION
OF PALAY ORDINARIO PRICES PER CAVAN IN TABANATUAN CITY
SINCE 1957

Figure →

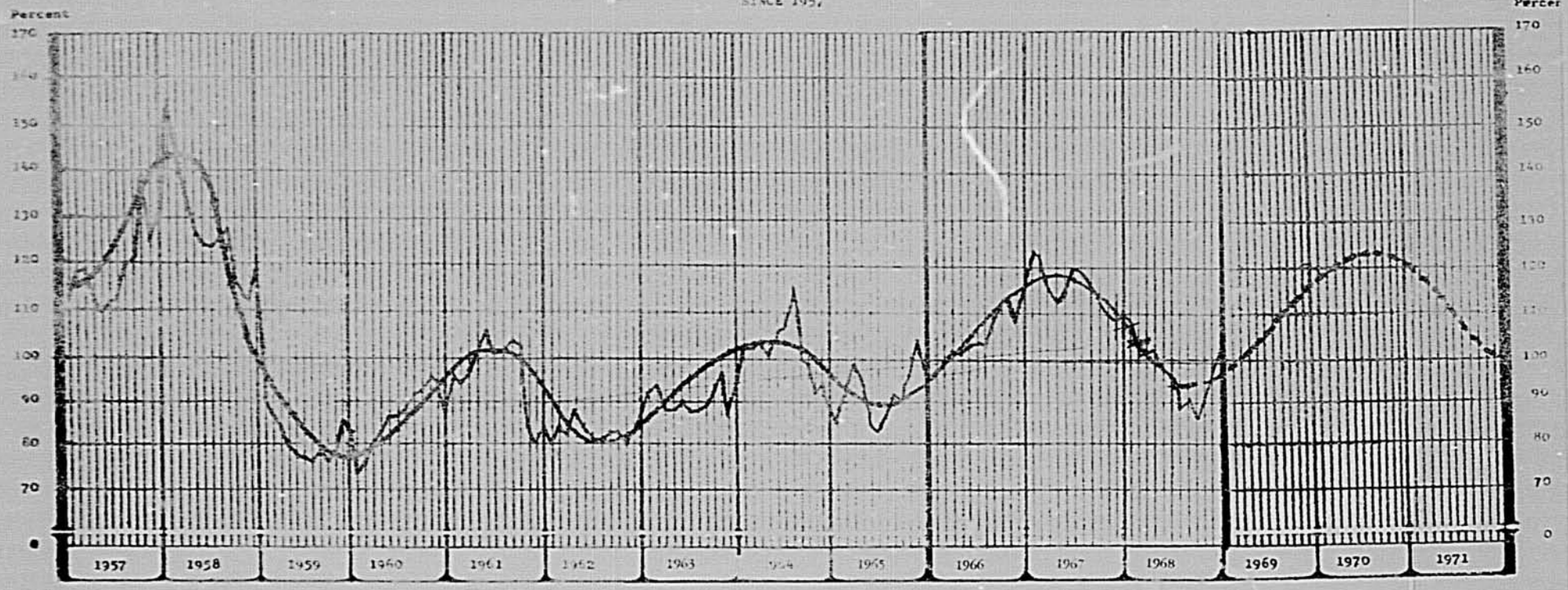


Figure 7

APPENDIX p. 50

* SOURCE BAA

Dr 7

FIGURE 7-A*

MONTHLY HARVEST OF PALAY IN THE PHILIPPINES
VS. SEASONAL PRICE INDEX FOR M-2 RICE IN MANILA
(1956-65)

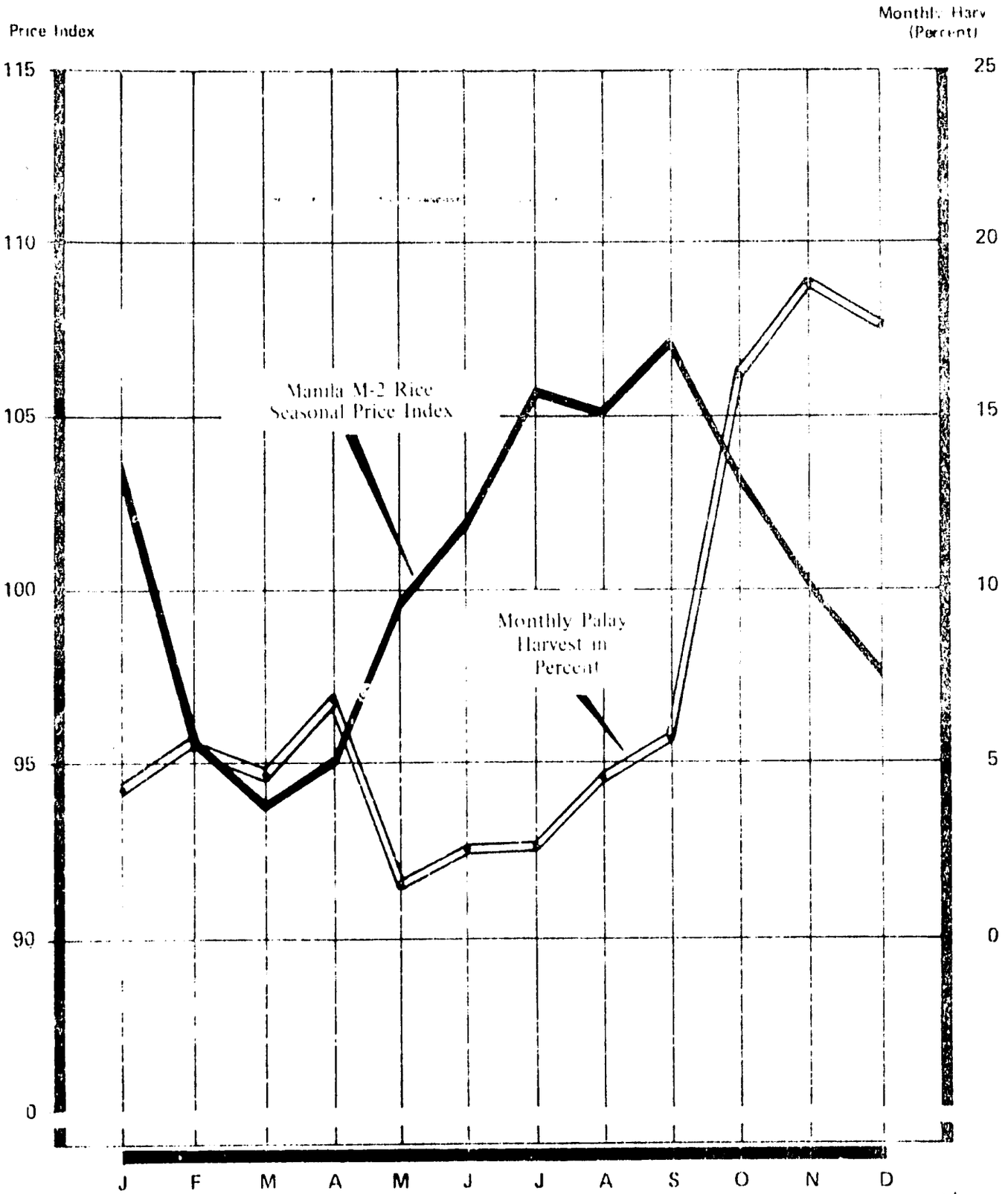


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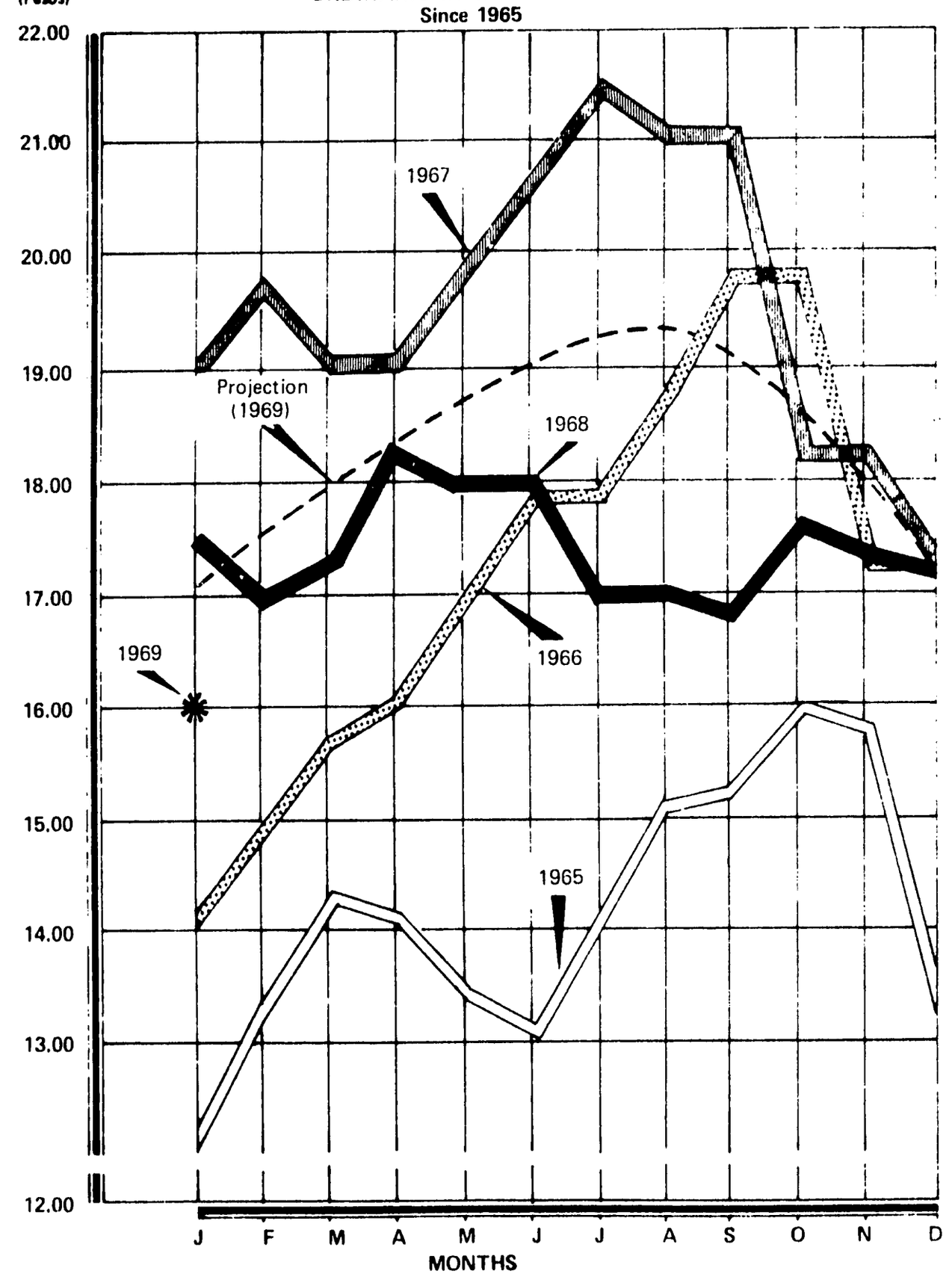
FIGURE 7-A

FIGURE 7-B

AVERAGE MONTHLY PRICE OF PALAY ORDINARIO IN CABANATUAN CITY

Since 1965



Source Bureau of Commerce and RCA Fieldmen (WHOLESALE PRICES)

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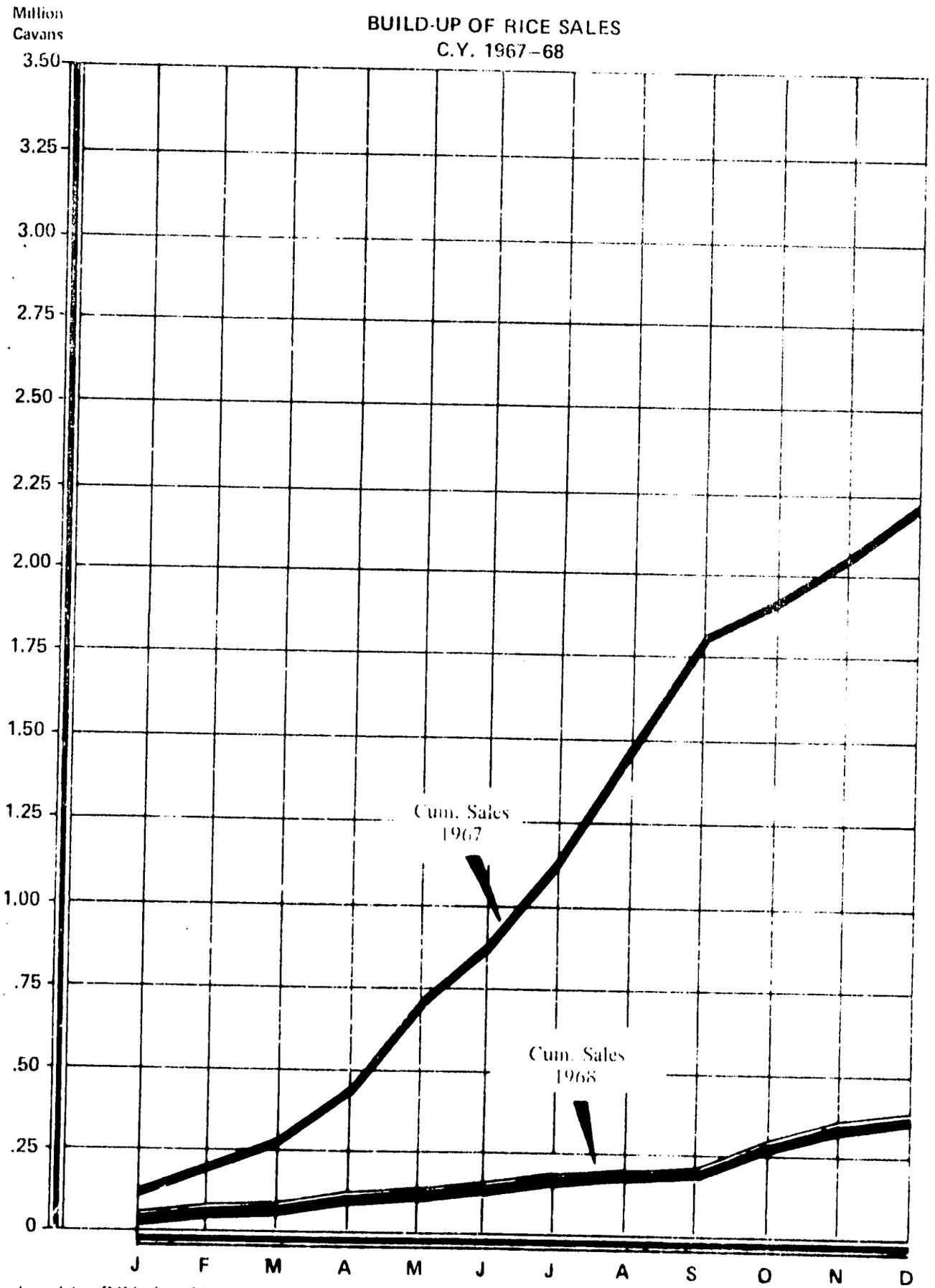
FIGURE 7-B

FIGURE 7-C

BUILD-UP OF RICE SALES
C.Y. 1967–68



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CUMULATIVE RICE SALES

FIGURE 7-C

FIGURE 7-D

FLOW CHART FOR PALAY
JULY 1967–JULY 1968

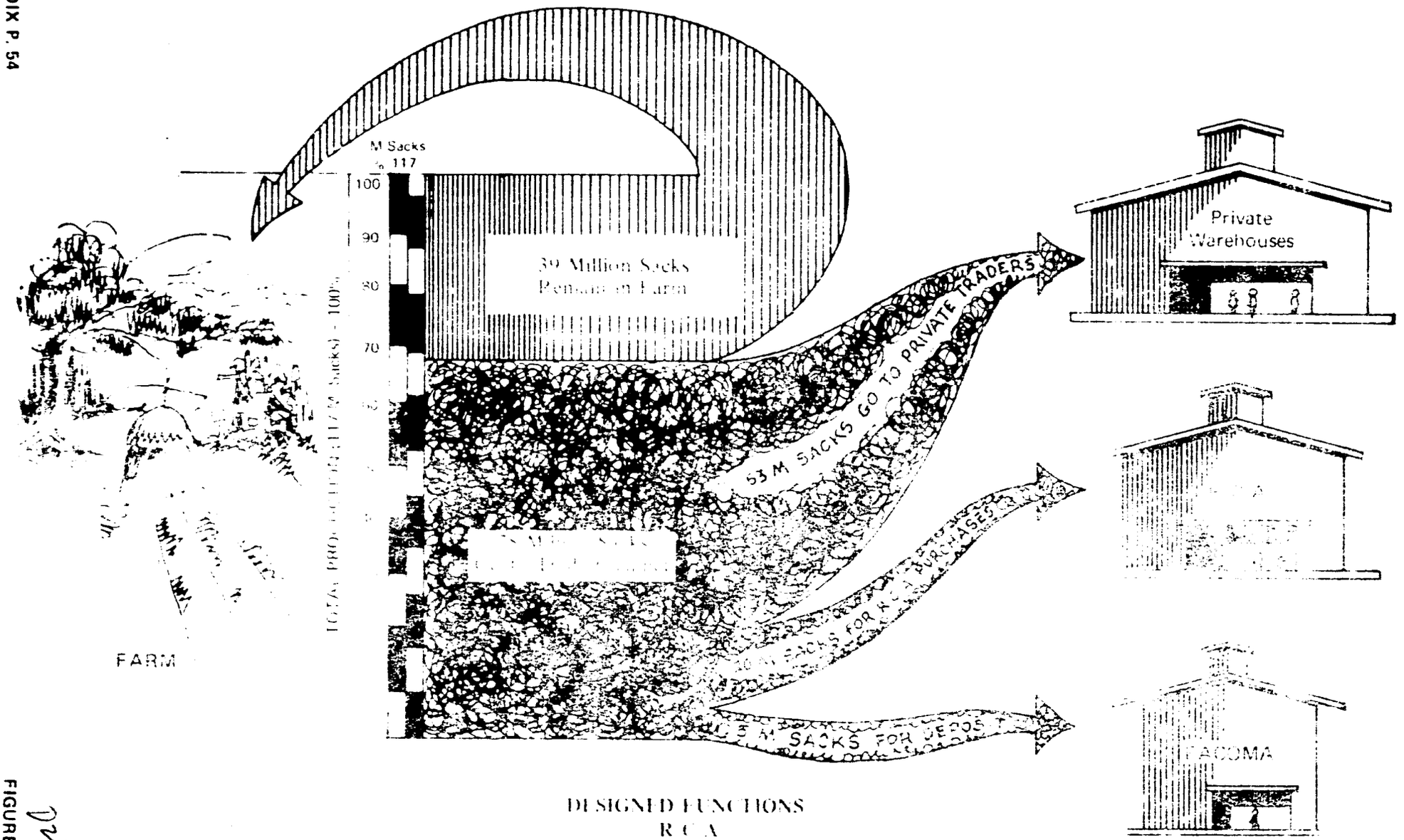
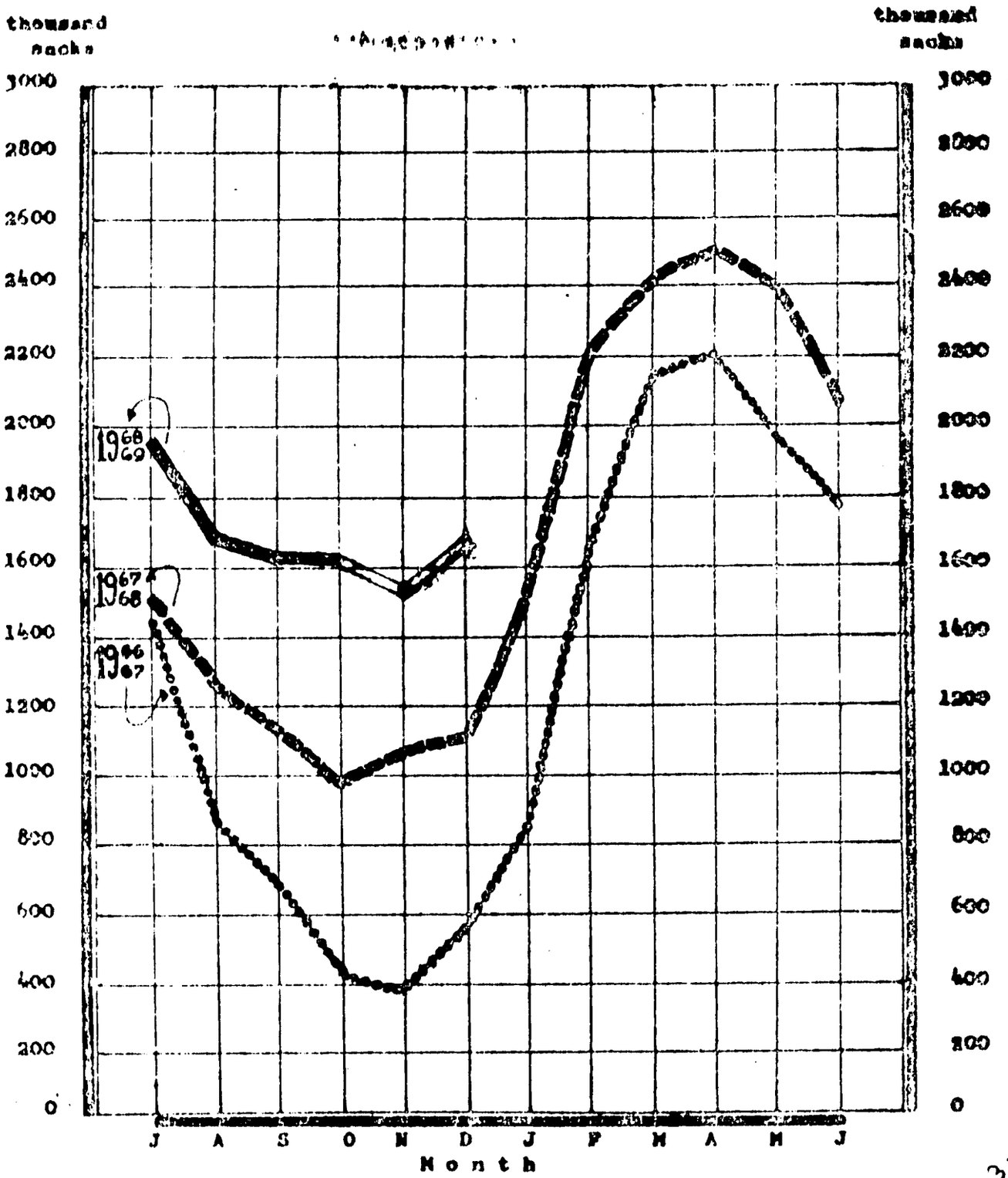


FIGURE 7-D

D233

"BEGINNING-OF-MONTH" RICE STOCK LEVEL IN
SELECTED PRIVATE WAREHOUSES SINCE 1966 a/
(PHILIPPINES)
Figure 7-E 77b/



a/- Includes palay stock converted into rice at 51% milling recovery.

Source: Reports of RCA Field Offices

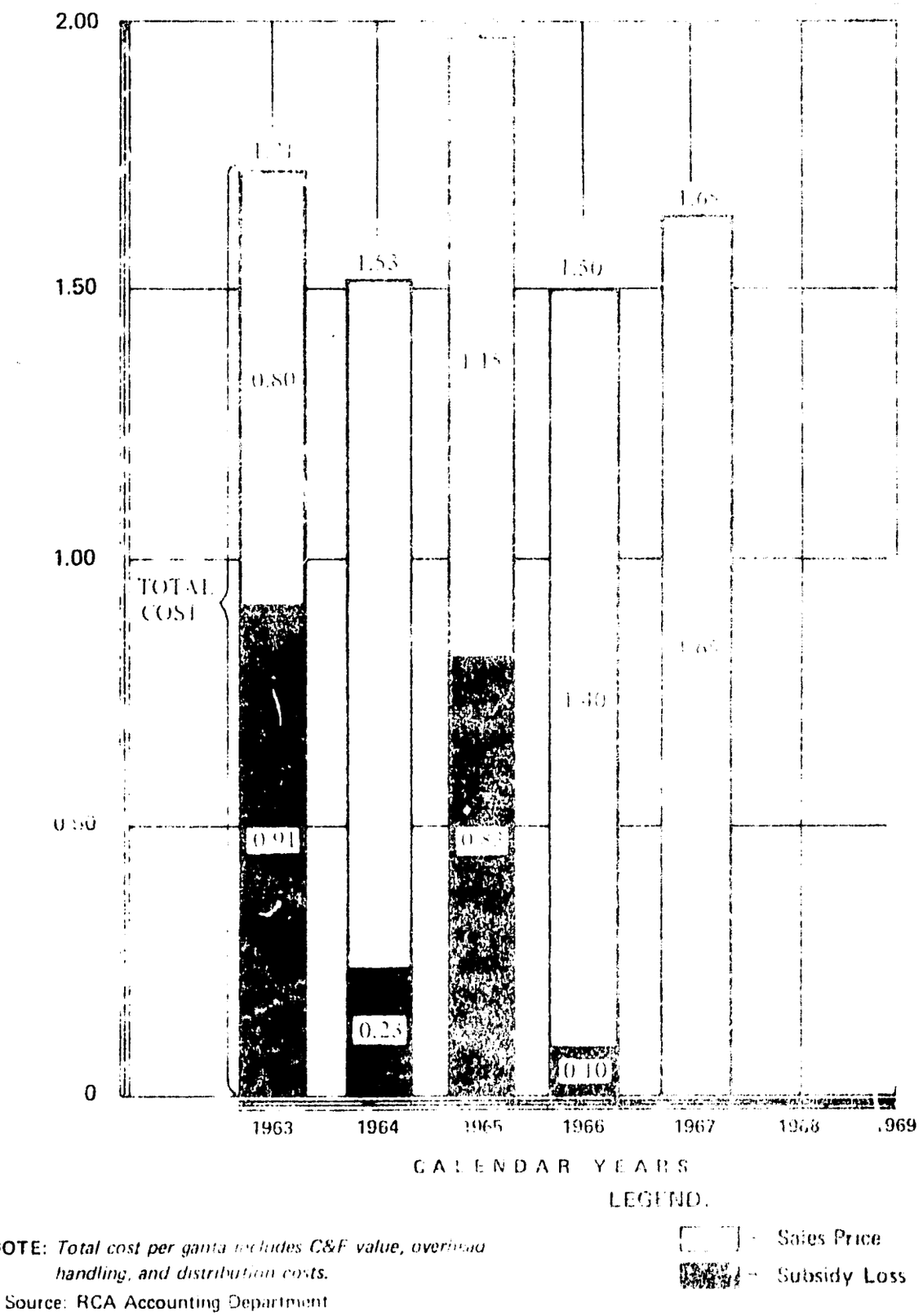
D234

77b

Figure 7-E 77b/

FIGURE 7-F

SUBSIDY ON SALES PER GANTA OF IMPORTED LIP
1963-69



NOTE: *Total cost per ganta includes C&F value, overhead handling, and distribution costs.*

Source: RCA Accounting Department

FIGURE 7-E

FIGURE 7-G

RCA APPROPRIATION AND RELEASES
1962/63–1968/69

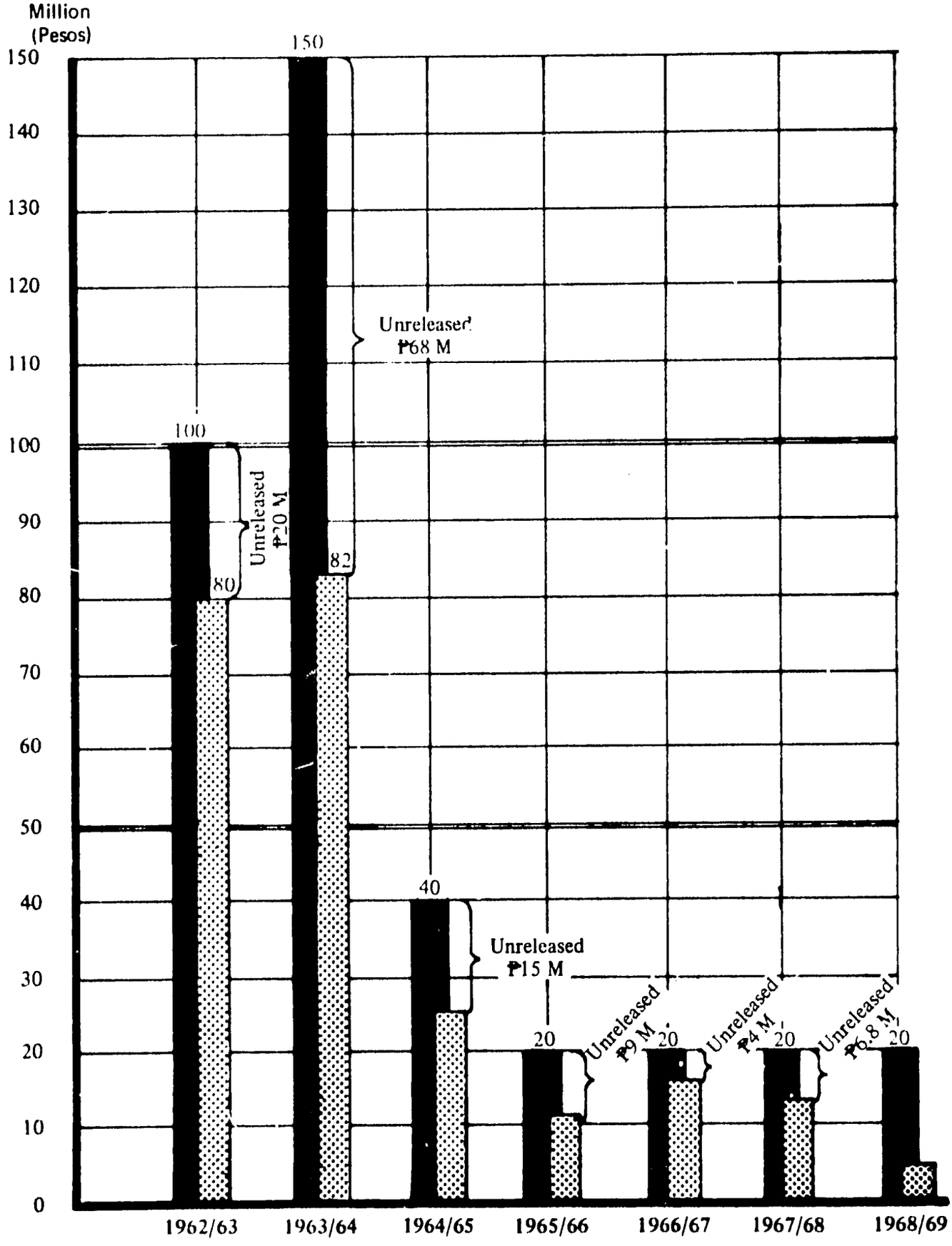


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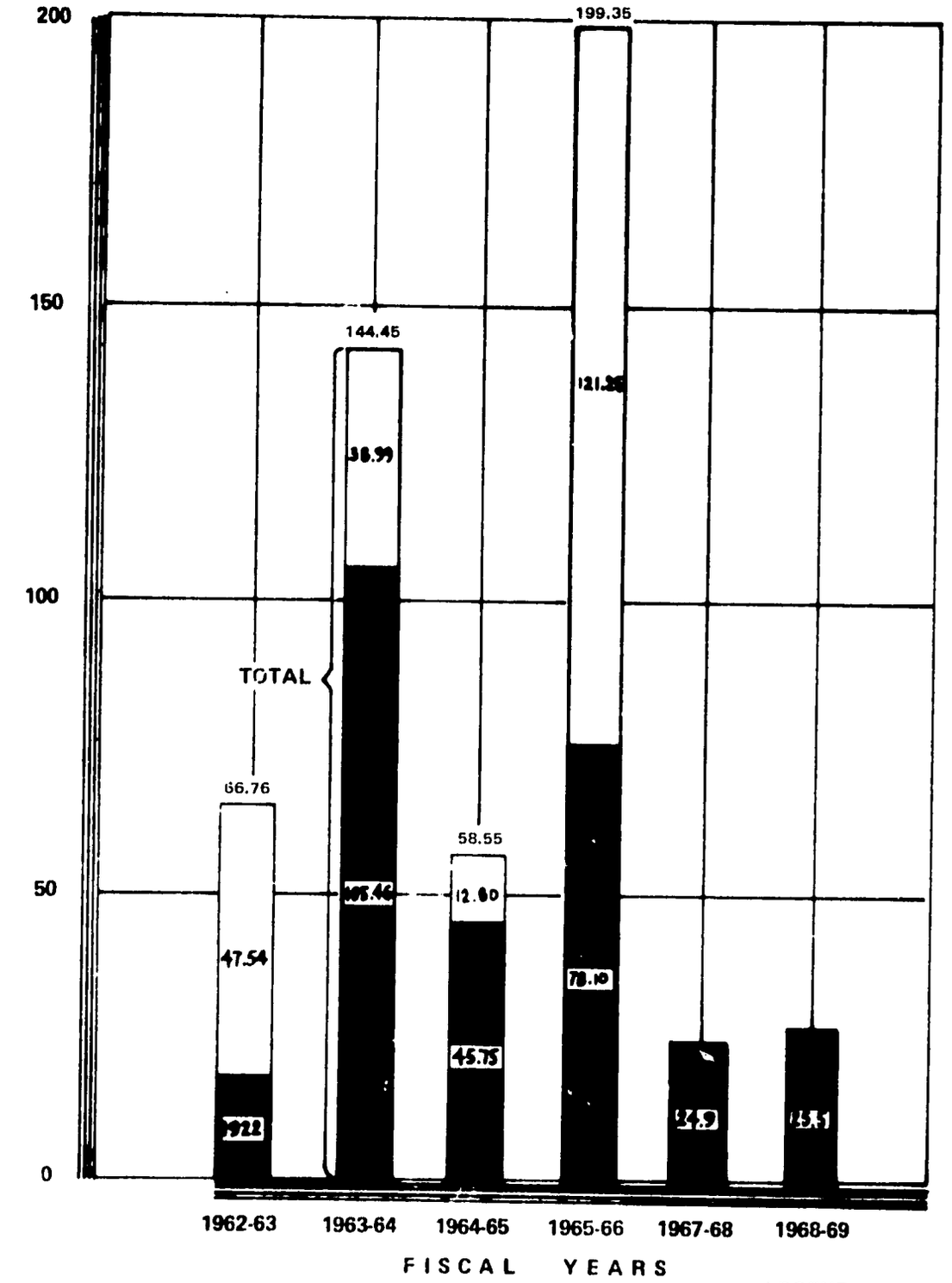
FIGURE 7-F

FIGURE 7-H

RCA EXPENDITURES PLUS UNPAID LOANS
1962/63 – 1968/69



LEGEND:
– Unpaid loan
– Expenditures

NOTE: RCA Expenditures include those for Palay and Corn imported rice, and operational expenses-unpaid loan (P121,25m). For 1965-66 represents entirely losses in rice importation.

SOURCE: RCA Accounting Dept., Quezon City

FIG. 7-G

D 237

FIGURE 8*

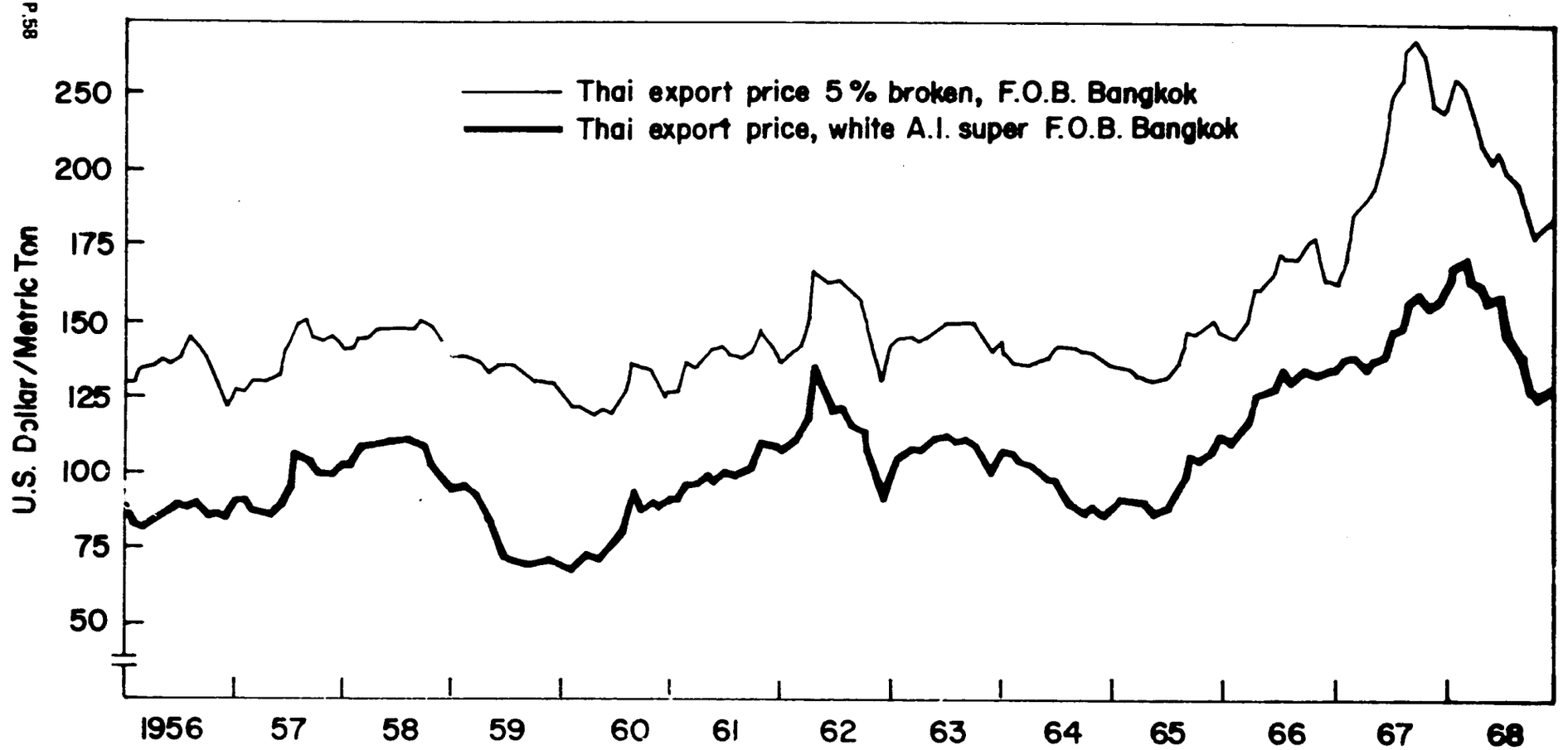
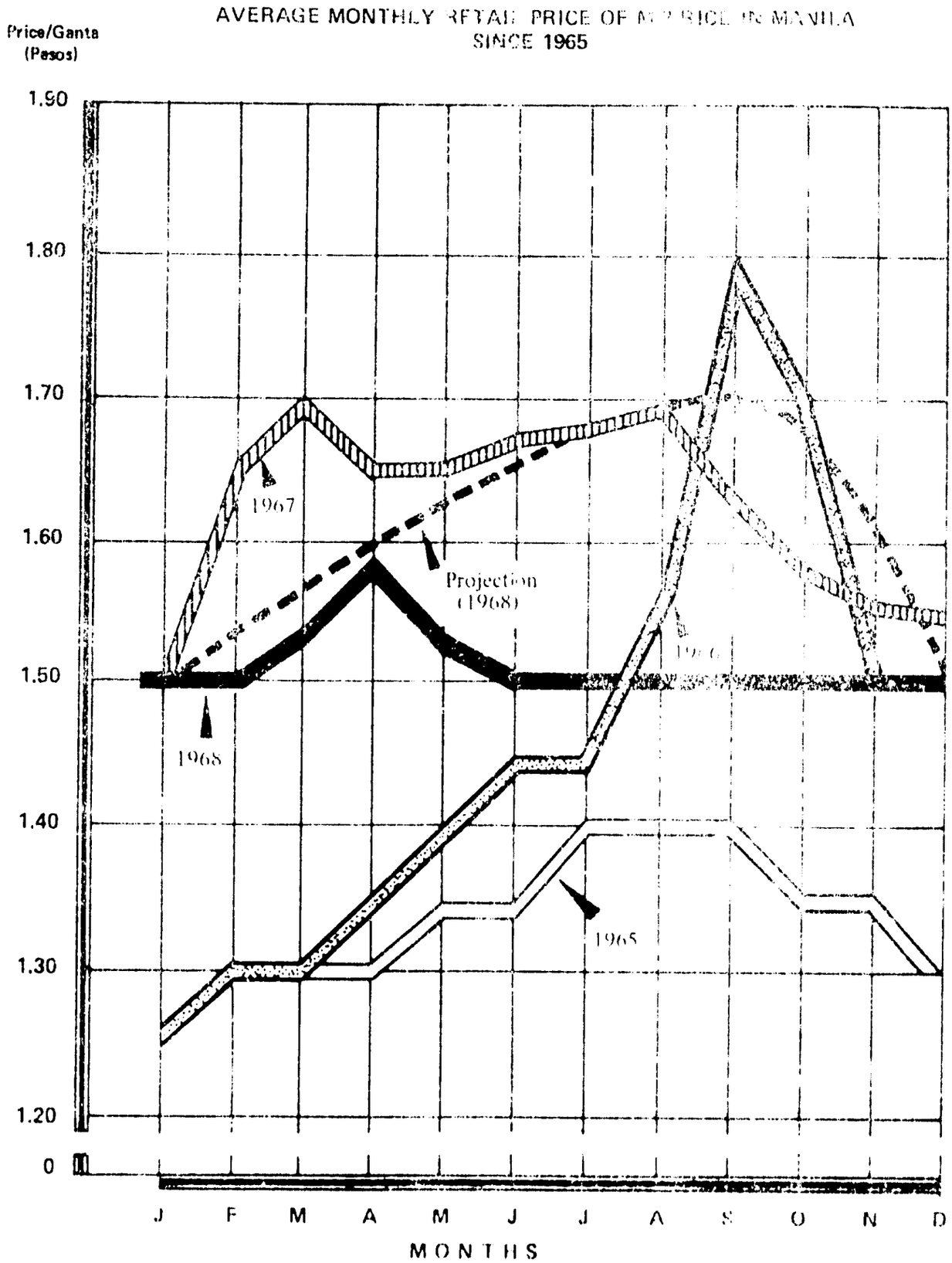


FIG. 8. The Thai export price of rice 5% broken and white broken A.1 super F.O.B. Bangkok.

*Research Review, Agricultural Economics, draft section for Annual Report, IRRI 1968, by Randolph Barker, dated January 31, 1969

[12] *op. cit.*, IRRI - Barker - 1968.

FIGURE 9



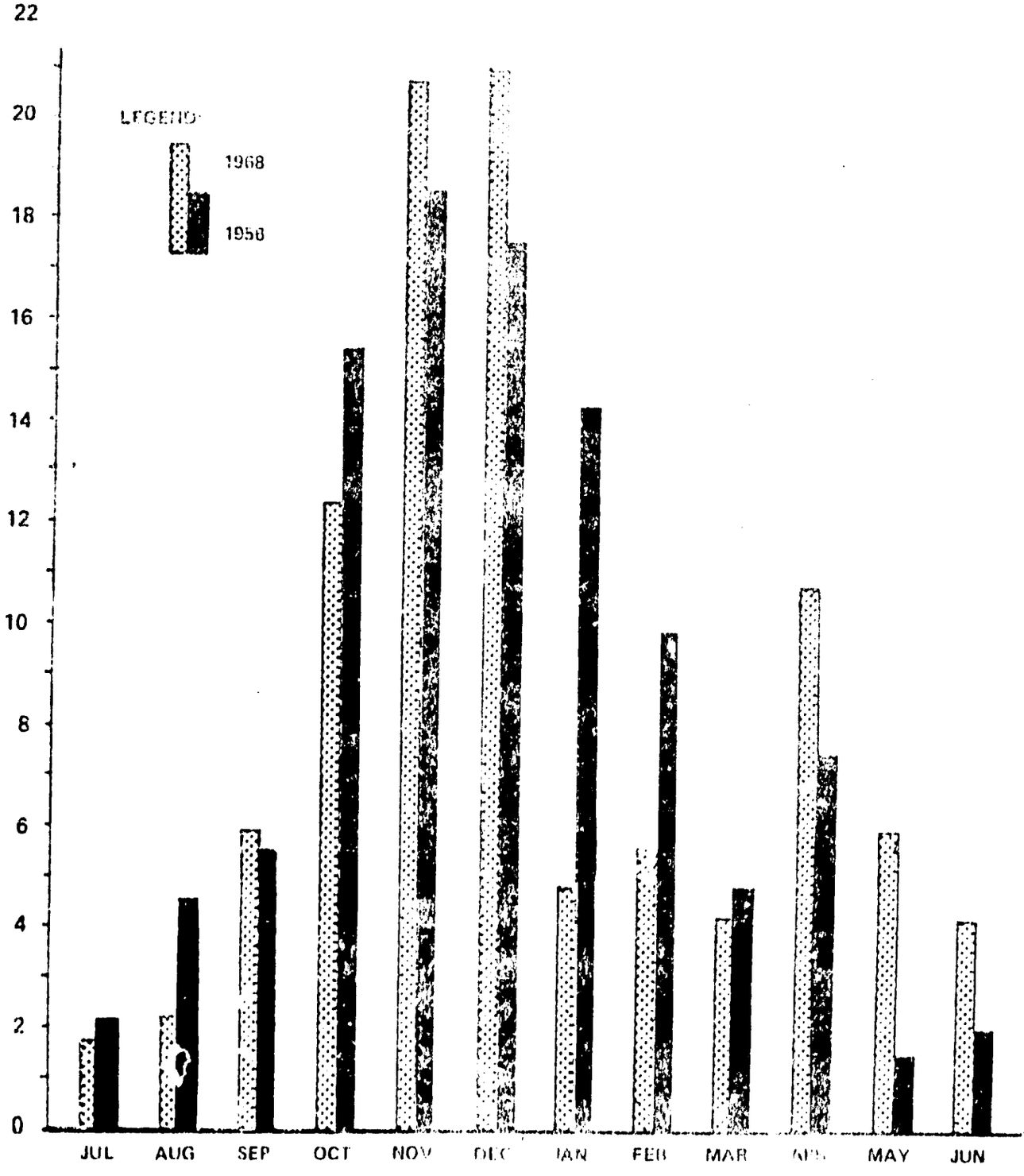
Source. Bureau of Commerce and RCA Fieldmen.

FIGURE 10

PALAY

MONTHLY PERCENTAGE DISTRIBUTION OF HARVEST*

PHILIPPINES



*Prepared by the Bureau of Agricultural Economics, DANR

FIGURE 10

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

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Batch 62

1. SUBJECT CLASSIFICATION

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B. SECONDARY: Plant production-Cereals-Rice--Viet-Nam Rep.

2. TITLE AND SUBTITLE
Rice in South Vietnam

3. AUTHOR(S)
(101) AID/ASIA/USAID/Viet-Nam

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1969	51p.	ARC

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AID/PPC/EMS

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(In AID Spring Review of the New Cereal Varieties,1969. Country crop papers: Viet-Nam)

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PN-AAE-004

11. PRICE OF DOCUMENT

12. DESCRIPTORS
Rice
Varieties
Viet-Nam Rep.
Yield

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15. TYPE OF DOCUMENT

AID 590-1 (4-74)

Spring Review

New Cereal Varieties

RICE in SOUTH VIETNAM

March 1969

USAID - VIETNAM

draft

Note:

USAID/Vietnam's presentation is arranged according to the subjects listed in AID/W's January 7, 1969 airgram to participating Missions. The packaged reproduced here includes:

(1) USAID Submission on Rice (40 pages)

(2) Additional Comments (A series of AID/W questions and USAID answers.) (2 pages)

(3) Comments by Carl F. van Haefton (5 pages)

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SUBJECT · Spring Review on New Grain Varieties

REFERENCE · (A) AIDTO CIR A-564
(B) AIDTO CIR A-29
(C) STATE 030045

1. A PAR has not been prepared for the Accelerated Rice Production Program. It was considered that the PAR itself would not significantly add to the attached comments on the Spring Review and Crop Paper on the IR-8 program in Vietnam. The Crop Production Program E-1 of October 15, 1968 (730-11-130-314) may be referred to for additional program financing and details in lieu of the PAR.

2. The comments on the Spring Review and the Crop Paper for IR-8 are attached and these follow the format requested in the attachment to Reference (B). USAID/Vietnam's general comments on sections apart from the Crop Paper were not specifically required in the instructions. They are, however, being sent to AID/W with the thought that they may be useful to the overall review. There is considerable redundancy in the paper caused by the repetition of questions. Information has been repeated where it is germane rather than making numerous references to other sections. It was thought this would make the report easier to read and use in AID/W. The Crop Paper portion incorporates comments on material supplied in Mr. Charles Fossum's letter of January 22, 1969 to Mr. Huffman.

9 S-W

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PAGE 1 OF PAGES 40

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AID-5-39 (11-65) PRINTED 3-67

3. The background paper referred to in Paragraph II, 5, b, of the attachment to Reference (B) has not been received in USAID/Vietnam, consequently, no comments have been made on it.

BUNKER

Attachment: Comments on Spring Review and Crop Paper on IR-8 Program - Vietnam

I.	Problems to be addressed	- Page	3
II.	Methods and Procedures	-	14
III.	Background Data IR8-288-3 (IR-8)	-	14
IV.	Country Crop Paper - IR-8 and 5 Rice Varieties in Vietnam	-	15
	Summary	-	38
	Appendix - Alternate Rice Production Possibilities	-	40

ATTACHMENT

COMMENTS ON SPRING REVIEW AND CROP PAPER FOR ACCELERATED (IR-8 and 5) RICE PRODUCTION PROGRAM IN VIETNAM1/

I. Problems to be addressed:

1. The following conditions are necessary to successfully introduce a new variety. It is not practicable to rank these in a strict order of importance because of their inter-dependence:

   a. A sufficiently high level of authority in the host country must sponsor the program to introduce the new variety and give it appropriate support. This support and high level interest must get to the lower echelons if a dramatic and large scale production result is to be reached.

   b. There must be a ready market for the new variety or an absolute assurance that a market can and will be developed. The price the farmer receives for the crop must be at a level that allows a reasonable net profit as an average for the conditions in that country. Such prices will generally prevail if government policy encourages a free and responsive marketing system and, further, does not encourage the maintenance of retail prices to urban consumers at levels below which they would normally establish in a free market. Such programs too frequently transfer all or part of the cost of such subsidization to the farmer producers.

1/ IR-8 and 5 Program and Accelerated Rice Production Program are used interchangeably throughout the paper and mean the same thing. Also, both IR-8 and IR-5 have been introduced into Vietnam, however, the major effort has been to promote IR-8. The hectarage reported herein may include some IR-5 plantings, but the areas would be minimal as only 5 tons of IR-5 seed was imported into Vietnam in 1968 as compared to 2,000 tons of IR-8.

c. The new variety must, under test in the country in which it is being introduced, perform close to the claims made for it. For example, higher yields, disease resistance, better quality, etc. It should be a real and easily recognized improvement over the local varieties.

d. Too radical a change in cultural practices or greatly increased production costs in comparison to the local varieties will result in slower acceptance by large numbers of farmers.

e. Policies for implementing the production program must be clearly spelled out and agreed to by the host government.

f. A program activity implementation plan must be prepared, project goals set, responsibility assigned, and necessary resources allocated.

g. A systematic approach to the management of the program must be devised so that problems may be anticipated, actions coordinated, and progress evaluated and reported. The program must not be left to chance and should not be managed or coordinated by a highly specialized or discipline-oriented person such as a soil scientist or plant pathologist unless he has previously demonstrated the administrative ability required. The program would probably be best managed by a generalist with a proven record of ability in program development, planning and administrative coordination.

h. A large-scale extension/information program reaching the lowest levels must be feasible and the institutions for carrying out such a program must be present.

i. A review of techniques used and special problems encountered and solved by other countries growing the variety should be made to provide guidelines for the new country's program.

2. What effect has the IR-8/5 Rice Program had in Vietnam:

a. The IR-8 and 5 Rice Program is already considered successful in Vietnam. The President, Prime Minister and Minister of Agriculture have all supported it at public meetings and in official

documents. This has raised the morale of agricultural personnel in Vietnam to a high level and provided a healthy climate for continued efforts in crops and in other agricultural programs such as animal protein.

b. The Accelerated Rice Production Program has and is contributing significantly to the pacification effort by effectively demonstrating to the Vietnamese farmers that the government is concerned about their welfare and is doing something about it. In short, the Vietnamese Government's pronouncements on IR-8 and 5 have demonstrated credibility so the affected farmers will listen again.

c. Several units of the Ministry of Agriculture now work more closely together in planning and coordinating their actions. The Agricultural Development Bank (ADB) field personnel meet regularly with the Agriculture Service Extension personnel in regional meetings on a periodic basis to discuss the rice production program. Joint training classes have been held. The MLRA extension workers are being called upon to prepare farm plan budgets to support crop production loan applications for the local ADBs and assist in loan collections.

d. The IR-8 and 5 Rice Program has greatly accelerated the planned transfer of the import, sale and distribution of fertilizer and pesticides from the government to the private sector.

e. Steps were taken by the GVN to purchase some rice from Delta provinces. The price of Title I rice was raised and actions were taken to move excessive rice stocks in Saigon to the central areas of Vietnam. While this is not considered a comprehensive policy and action program, it could be the first steps of an integrated floor price and commodity loan program. The raising of the selling price of Title I imported rice had the effect of supporting the price of paddy which the farmer sells.

f. The shorter growing variety (IR-8 maturing in 125 days) affords the Vietnamese farmers an opportunity to double crop in many areas. This is particularly true where IR-8 rice is followed with sorghum grain. (A rice/grain sorghum program is presently in the planning stage.)

g. The Asian Development Bank, at the GVN's invitation, sent a representative to Vietnam to review the feasibility of establishing a system of private rural banks in Vietnam similar to the successful system established in the Philippines. Considerable local interest has already been generated and even local subscribers for stock capital to organize the banks were solicited. Response has been favorable and exceeded expectations.

h. The Accelerated Rice Production Program has given greater urgency to land reform efforts in Vietnam. It is expected that increased net returns from the improved rice varieties will result in a reluctance on the part of land owners to part with their holdings. The GVN has recognized the importance of moving ahead rapidly on the voluntary purchase program whereby tenants can buy land on favorable terms and is now supporting this program with renewed vigor.

i. The IR-8 and 5 Rice Program, because of its high level support, wide geographic application and accelerated nature, has brought to the attention of thousands of Vietnamese farmers the benefit of modern, improved and scientific farming techniques. This leads to the use of more pesticides, fertilizers and farm machines and stimulates accelerated agri-business development in Vietnam.

3. What are the definable relationships between specific AID supported agriculture activities, the introduction of the new grain varieties and increased yields:

a. USAID/Vietnam, up until late 1967, did not officially support the introduction of IR-8 and 5 into Vietnam. Unofficially, the IR-8 and 5 seed did come in to the country through agriculture advisors who had been given rice production training at the International Rice Research Institute in the Philippines. The reason for USAID not endorsing and encouraging IR-8 and 5 was that the GVN agronomists taking the more traditional approach thought it should be more fully tested in government stations. USAID's Chief of the Rice and Crops Division in 1967 agreed with this and did not attempt to encourage the GVN to change its policy and he resisted any significant trials of IR-8 and 5 by US technicians.

b. During 1966-67, USAID concentrated project support for vegetables, fruits, fibers, food processing and research. No really effective effort was made to achieve a production breakthrough in rice, corn or grain sorghum during those years. As late as July 1967, there was doubt both in Saigon and AID/W about the need for increasing rice production. Some argued that since rice could be readily imported, it would be better to use scarce resources in the rural areas to increase production of commodities which could not be readily imported. To increase or not to increase rice production was the question. This led to a lot of unnecessary uncertainties with respect to agricultural plans, goals and programs. The rice production policy in Vietnam was finally and firmly resolved during the meetings in Hawaii in the early fall of 1967. It was then decided to go all-out for the rice program at the highest level. This led to USAID's preparation of the rice goal plan which finally set the policy that a rice production increase was desirable, necessary and feasible, despite a labor shortage and lack of security in the rural areas. This got to the highest levels in Washington and was accepted and vigorously supported by USAID and the Department of Agriculture.

c. The key factor in this item is, "to what extent did AID contribute to the development of a system capable of adapting agricultural innovations and applying them on a wide scale".

(1) In late 1967, USAID/Vietnam prevailed on the Minister of Agriculture to visit IRRI in the Philippines.

(2) It then encouraged the GVN to support an accelerated rice production program using IR-8 and 5.

(3) It reorganized its own agricultural office to provide effective support for an action rice production program.

(4) It assisted in preparing a management system for the program so as not to leave the management decisions and actions uncoordinated or to chance. The management

technology of PERT (Program Evaluation Review Technique) and LOB (Line of Balance), on a modified basis was used.2/ This system recognized that the rice program was a production effort; more complicated than manufacturing but with enough similarities to permit the scientific management approach so effective in industry. For example, it considered needs to be filled, it identified goals and the supporting facilities and commodities required, the policies necessary, and the step-by-step procedures to be followed within a time frame to reach the desired goals. This management system approach has been of decided help to the GVN in planning and reaching its program goals.

(5) It financed the foreign exchange cost of approximately 3,200 tons of systemic pesticides, which had a value of $1.7 million, for sale to farmers in local currency for the protection of the IR-8 and 5 plantings. Systemic pesticides had not been used by Vietnamese farmers previous to this importation.

(6) It financed, as a grant, the importation of 45 MT of IR-8 rice seed for the Vo Dat support effort in October 1967 plus another 2,000 MT of IR-8 seed for the 1968 44,000-hectare production program. A small quantity, 5 MT of IR-5 seed was also imported in 1968. The value of all of the seed was in excess of $450,000.

4. Effective means for organising research for tropical and sub-tropical agriculture:

a. Obviously, the research provided by the International Rice Research Institute in the Philippines has provided a significant breakthrough in rice improvement. IRRI not only developed the improved seeds IR-8 and 5 but also many other varieties which from early tests appear to be superior to IR-8 and 5.

2/ See A Management System for Agricultural Development, R. F. Smith. Available VN/REIR, AID/W.

b. In addition to research on seed development, nutrition, insects and diseases, IRRI also has proven that rice production training for technicians is best done in a combined field/classroom situation. The multiplication of this technique of "learning by doing" has been spectacularly successful in all other countries where it has been tried. It is so well known that it does not need further comment in this paper.

c. IRRI's sponsoring of applied tests in selected countries is also a proven success. In Vietnam, there are currently over 100 new varieties being tested in the GVN rice stations, many of which come from or were supplied by IRRI.

d. Rice varieties developed in other countries, in some cases with assistance from AID or private foundations, also are being tested in Vietnam. At least two such varieties show promise; one from the University of the Philippines College of Agriculture - C-18; the other from the Bureau of Plant Industry in the Philippines - BPI-76.

e. AID should continue to sponsor production and research programs in Asia and support institutions like IRRI, the Asian Vegetable Research Center in Taiwan and the University of Hawaii's synoptic efforts in rice diseases. AID can continue to disseminate information to its Missions and sponsor advanced education for its foreign service technicians in the areas where they can improve their professional capabilities and make contributions to agricultural production programs in LDCs.

f. Where resources, including technical and scientific personnel, facilities and support materials, are limited in a LDC, the government should be encouraged to streamline research to gain the most advantage from limited resources. For example, there is serious waste in many LDCs which is covered up under the guise of research. In Vietnam, there were more than nine agricultural research stations which were inadequately equipped and poorly staffed. Most of them did not have specific programs or well-defined project activities. In addition, support services were not available and competent observation and reporting of

results were sadly lacking. LDC governments should contract or otherwise cooperate with their own universities wherever feasible to carry out well-coordinated adaptive and applied research. This conserves funds and produces more meaningful results. AID should encourage and support agricultural research in LDCs where the programs are jointly reviewed, plans specified and administrative improvements instituted. Selected university efforts in the LDCs should be given priority wherever feasible in contrast to encouraging the development of new government research stations per se.

5. What in general were AID and other US agency roles in bringing about changes in the institutions' policy, programs and practices:

a. USAID's Public Administration Advisors participated in a study resulting in a reorganization in the Ministry of Land Reform and Agriculture. This brought better coordination among associated and inter-related functions. For example, Extension, Plant Protection and the Rice Service were brought together at the provincial level under a single Agriculture Service Chief. This provided better coordination for programs, it defined responsibility, and permitted meaningful delegation of authority. This reorganization now permits more effective problem resolution and program implementation at the provincial level. A similar change in the organizational structure was effected in the Ministry headquarters following similar consolidation of functions.

b. The International Rice Research Institute, in cooperation with USAID, assisted the GVN in the development of the National Rice Production Training Center in Vietnam based on the same training techniques and methods employed at IRRI. The NRPTC has been in operation since April 1968 and has trained several hundred Vietnamese rice production technicians to date. Some applied research is also conducted at the Center such as varietal, nutritional and environmental tests.

c. USAID has been successful in persuading the GVN to participate in a survey of the grain storage, handling and marketing facilities in the country. A project agreement has been signed

bringing together the Ministry of Agriculture, responsible for production aspects, and the Ministry of Economy, responsible for price and marketing policies. These agencies, in sponsoring the project study, have agreed to bring the private sector into the survey so that the respective roles and talents of the private sector and government can be defined and exploited.

d. USAID has convinced the GVN to take measures to adjust the price of imported rice upward so as to provide what amounts to some price support for locally produced rice.

6. Other beneficial possibilities not yet fully explored:

a. The shortened period of growing needed for IR-8 and 5 affords Vietnamese rice farmers an opportunity to produce supplemental crops. Considerable portions of the rice paddies which enjoy residual moisture or even a few rainfalls after the rice harvest, presently are left fallow for several months of the year. A program is in the stage of preliminary planning to take advantage of this for planting grain sorghum. Grain sorghum, following a single rice crop, is highly feasible in Vietnam and would support the animal protein program. Sorghum does well with only limited water to start it in its early growth stage.

b. Multi-cropping with rice is also a good possibility in Vietnam. A test project utilizing the work which Dr. Bradfield has done at IRRI is under consideration. The objective is to test and demonstrate that compatible crops can be grown in specially prepared fields at the same time as rice. Crops to be tested would be soybeans, mung beans, sorghum and vegetables.

7. What problems directly involving the new varieties most urgently need our attention:

a. Both IR-8 and 5 rice varieties are relatively very high yielding. They promise to provide the increased production necessary to meet domestic rice needs in Vietnam. However, neither of these rice varieties is considered to be a high grade table or export

quality rice. If an export market is to be regained, then, there has to be other improved varieties in production in combination with IR-8 and 5. A general improvement in the rice varieties grown in Vietnam and a reduction in their number is necessary. Improvement in varieties and seed multiplication requires supporting a marketing and grading system of rice which provides the economic incentives to implement the program. For example, if the government establishes that it will purchase for its institutions, for the military, etc. certain varieties and grades in these varieties, it helps seed multiplication advisors to persuade farmers to grow them.

b. Short maturing varieties result in more rice being harvested in the rainy season. This requires changes in harvesting, drying and storing techniques. These problems are now being studied.

c. With the increased interest by most Asian countries in rice self-sufficiency programs, thought should be given to AID sponsoring a regional symposium in rice marketing and production problems. The symposium could explore, among other things, the desirability of establishing standards for the marketing of rice, also whether insurance stocks against natural disasters held by cooperating countries would be feasible or desirable.

d. Farm mechanization and irrigation are problems which are not now adequately being studied. With the long growing season in Southeast Asia, special machine development and irrigation systems have the prospect of providing crops to the market all year long with improved seeds and management techniques.

C. What ancillary or consequential problems are being created:

a. USAID advisors are concerned that there could be an over production of rice in Vietnam unless a good marketing system provides some balance. The balance between requirements for domestic use and an exportable surplus requires an enlightened policy and an action

program by the government. In the Philippines, there is a Rice and Corn Administration which attempts to stabilize prices and assist in the marketing of rice and corn. No such system exists in Vietnam. It is believed that unless some measures are taken to provide the Vietnamese rice market with balance and coordination, that serious problems will arise as production increases particularly if past export markets cannot be regained or are no longer available.

b. There is an immediate need for the improvement of storage, handling, harvesting and milling techniques in Vietnam. Grains going out of condition and improper milling alone cause a considerable waste of rice in the country. A study of this is now to be implemented.

9. What conclusions can be drawn for agriculture development in general:

a. Cooperative agricultural programs in LDCs should be better planned and comprehensive in scope. They must be in concert with the policies and aspirations of the host government and be directed to improving the economic well being of the farmers and development of the rural areas. AID's development efforts in agriculture cannot be piece-meal and uncoordinated. Many projects fail because they lack effective planning, continuity of project management, administrative coordination, and progress evaluation and follow up. For example, the introduction of pure bred herds of swine without an appropriate feed program and health program will fail. Often USAID technicians start projects and these fail merely because the initiator does not stay to assume responsibility for completing the critical months or years of the project implementation. All component and necessary parts of any agriculture program, whether it is animal protein or crops, must be well planned and each resource in place when and where it is needed, and under the direction of a single project manager.

b. Private agri-business should play a more major role in LDCs. The private sector must be developed as much or more than Government institutions. AID should support this policy and unless the host government encourages the development of private business insofar as possible, program support should be transferred to other countries where the governments cooperate with, support and assist in developing their private sectors.

c. It is much easier to obtain institutional changes and strong support from top level government officials if a program has very clearly defined goals to be achieved in a specified time frame. This is particularly true if production targets are involved.

II. Methods and Procedures:

No comment by USAID/Vietnam on this section as no PAR is being submitted. See the E-1 on Crop Production of October 15, 1968 (730-11-130-314).

III. Background Data IR-8-288-3 (IR-8):

IRRI's development of the new rice variety IR-8 started in 1962 when a plant scientist at IRRI took pollen from a short indica rice variety, Dee-geo-woo-gen, from Taiwan and placed it on a tall tropical indica variety called Peta. In the Institute's plant breeding records, the cross was designated IR-8.

As a result of this cross, 130 seeds were formed which were carefully grown in IRRI's greenhouse to produce the first generation plants. Seeds from the best of these plants were then planted in the open research field to provide a second generation of about 10,000 plants. The plants in this generation that were too tall, late maturing, or otherwise undesirable were discarded. Seeds from the remaining plants having the desirable qualities, e.g., short stems, early maturing, heavy panicles, were selected for replanting in the nursery where disease susceptibility is tested. The process of selection and replanting went on until finally a satisfactory superior plant was selected and designated IR8-288-3.

This new variety had many highly desirable qualities -- a strong seedling vigor, high tillering ability, short stature (90-105 cm) and a stiff straw which makes it resistant to lodging.

The variety responds to high levels of nitrogen which produces higher grain yields; and it is moderately early maturing, taking about 125 days from seeding to harvest. Late maturing varieties take from 150 up to 160 days. IR-8 is insensitive to photoperiod, has moderate seed dormancy, and is moderately resistant to the tungro rice virus. IR

addition to tests by IRRI at Los Banos, IR-8 was also tested in variety trials throughout the Philippines and in several other Asian countries. As a prolific producer, IR-8 had no peer. The eating quality is also acceptable for most of the Asian market and it has been found to be very desirable in the manufacture of rice noodles in Vietnam.

IR-8 has some undesirable characteristics. It is moderately susceptible to bacterial leaf blight and is highly susceptible to a few races of rice blast fungus found in the Philippines. The grain is of medium size, chalky, prone to breakage and the head rice milling recovery is therefore fairly low.

IV. Country Crop Paper - IR-8 and 5 Rice Varieties in Vietnam:

Background:

Vietnam was traditionally a rice exporter up until 1964. The war so upset the production of rice that in 1967, it was necessary to import over 750,000 metric tons of rice to satisfy domestic needs. In 1968, this amount was reduced to 677,925 metric tons.

A small quantity of IR-8 and 5 seed was introduced into Vietnam as early as 1966 and was officially tested at the Long Dinh (Dinh Tuong) Rice Experiment Station in the fall of 1966. In the spring of 1967, more tests were made at the Ninh Thuan, Phu Yen and Thua Thien Rice Experiment Stations. The tests were satisfactory, the strains displayed good characteristics, and production capacity of each strain was rated as high.

Some large demonstration field trials of the IR-8 and 5 varieties took place in several provinces during the first crop planting (April-August) 1967 and most reported observations ranged from satisfactory to excellent.

A local flood in the village of Vo Dat in Binh Tuy Province during August 1967 wiped out the newly planted main local rice crop of several hundred hectares. Because IR-8 was a short-maturing variety, this presented an opportunity to try planting it on a larger scale and help the affected farmers in Vo Dat recover from the flood damage. Forty-four tons of IR-8 seed were brought from the Philippines and about 500 hectares were planted.

Vo Dat was never meant to be an ideal or controlled experiment. The planting of IR-8 did, however, provide some valuable experience and information and at the same time help the local farmers in time of serious trouble. Of the final 134 hectares which were reported by competent observers as harvested, the average yield was 2.5 metric tons of paddy per hectare. Local varieties only yield an average of about 1.5 metric tons in Vo Dat.

This yield of approximately 335 metric tons was considered an excellent result in view of the many problems experienced in Vo Dat. The land preparation was poor, dikes were not well constructed, planting was erratic, and no replanting was done. Fertilizer, when applied, was too late and unevenly distributed and there was a serious shortage of water. This lack of water caused over half of the rice hectarage planted to IR-8 in Vo Dat to be lost. In spite of this, from the 335 metric tons of IR-8 paddy, 80 tons was purchased as seed for distribution to other provinces.

The Minister of Land Reform and Agriculture, in December 1967, visited the International Rice Research Institute in the Philippines with several of his rice and agronomy advisors. Some USAID officials from Saigon accompanied the Minister and his party. It was then decided by the Minister to launch an Accelerated Rice Production Program. This program called for a massive technician training, farmer education and rice production support effort. IR-8 was selected as the improved seed and it was decided by the GVN, with USAID agreement, that 2,000 metric tons of it should be imported from the Philippines to start the program in Vietnam. In January 1968, the Vietnamese provincial agricultural chiefs and heads of services were brought to Saigon to formulate the program and set it in motion. It was decided at this meeting, among the agricultural participants, that 44,000 hectares of IR-8 rice seed would be planted in 34 provinces for the 1968 program.

On February 11, following the Tet attack, the MLRA reviewed and re-evaluated capabilities and decided to go ahead with the program as planned. For policy, it was the Ministry's program; the US input would be advisory and cooperative; it was recognized that paddy price to the farmer was of critical importance; the private sector (agri-businesses) should be involved to the greatest extent possible; and that generally, sound technical assistance would be offered the farmer instead of give-aways or doles.

The program was considered a two-part effort - the training, research, extension activities and the production, physical input and support activities. Normally, a program of this magnitude would put training, research, extension and demonstrations before any massive production. Time and the need for immediate results dictated otherwise. Program implementation was started in January 1968 insofar as resources would permit.

1. How far and how fast have the new varieties spread:

   a. Combined plantings, 1st and 2nd crops during the 1968 production program (April/August - October/January), reached the 44,000-hectare goal. About 22,000 farmers in 34 provinces were involved in the first crop IR-8 plantings. Some of these same farmers planted IR-8 again during the second crop planting, however, the actual number of these is not known. The estimate of all farmers planting IR-8 during both seasons in the 1968 crop year is 41,000 farmers, some of whom have been counted twice.

   b. Most of the hectares planted to IR-8 rice have had controlled water but it is not known how many were fully irrigated or non-irrigated rain-fed paddies.

   c. A farm plan budget form was devised in early 1968 for the special supervised credit IR-8 rice crop loans. MLRA officials considered the system too difficult to initiate in view of the short lead time, lack of technician training and shortage of supervised credit personnel. Consequently, little reliable information is available on the participating farmers from which an economic profile of these can be drawn. The land size of the average farm varies greatly from less than one-half hectare in the North to almost 2.0 hectare in the Southern Delta. Approximately 70% of Vietnam's rice is grown in the Delta.

   d. The IR-8 yields in Vietnam averaged over 5 metric tons per hectare on the approximately 23,000 hectares planted during the first crop of 1968. The local varieties average only 2 metric tons. Based on a scale provided by the MLRA, a farmer, with a family of five, producing the average 2 tons of paddy

can market about 100 kilos of this paddy as excess to his production costs and family consumption requirements. The same farmer producing 4 tons would, on an average, market 1,100 kilos or 11 times as much while if he produces 6 tons, he would have 2,300 kilos to market or 23 times as much.

With respect to the national production effort, Appendix A illustrates the relationship of planting IR-8 to local varieties on the reported 2.2 million hectares of riceland presently being cultivated in Vietnam. This table only assumes one crop is grown. Double cropping, of course, adds to the total production. When the planting of 540,000 hectares of IR-8 is reached between 1970 and 1971, the country should be producing 6,000,000 tons of paddy which is the estimated output needed for rice self sufficiency.

2. Factors which helped launch the program:

a. South Vietnam had to import approximately 750,000 metric tons of milled rice in 1967. This was alarming to both the GVN and US officials. The need for increasing domestic rice production immediately was of vital importance.

b. The new varieties of rice, IR-8 and 5, were being grown in the Philippines and with spectacular production increases.

c. The Minister of Agriculture visited the International Rice Research Institute in the Philippines to investigate and learn about the new rice varieties. He was enthusiastically interested.

d. Some of the limited plots previously planted to IR-8 and 5 in Vietnam were reported very successful and yielding two or more times the local varieties.

e. USAID, in encouraging the GVN to start the program, sponsored the Minister's visit to IRRI and gave assurance of its cooperation and support for an accelerated program.

f. The IR-8 program has been successful enough so that a corn/grain sorghum program could now follow to take advantage of the rice program's momentum, organization and techniques. Most of the system would be transferable. Sorghum planting kits, ADB credit loans, the program management system modified to sorghum rather than rice, etc., could be employed and exploited. (Preliminary plans are in process to do this.)

3. Institutional base of the program:

a. Describe the institutions:

(1) Research and Extension -

GVN Institute of Research operates administratively from a central office in Saigon. This office has a Director, an Associate Director, and five sub-divisions including agronomy, soils, horticulture, experimental stations and a general support unit. The field operations include nine research stations of which four are presently active in applied field research on upland rice, row crops, tree crops and vegetables but excluding lowland rice. The extent of field research has been limited due to the lack of supervision and direction from Saigon, insufficiently trained field supervisors responsible for test plot implementation and data collection, and an overall shortage of day laborers and operational funds and equipment. Area insecurity has also adversely affected the program. The two primary phases of USAID advisor assistance has been directed at program planning and project implementation.

The GVN Rice Service is organized within the Directorate General of Agriculture. The Service is headed by a Chief and has one assistant and three technicians. The Rice Service has the sole responsibility for paddy (lowland) rice research and production. The field operations consist of a national rice station at My Tho and seven substations located in various provinces from Hue to Long Xuyen. Each station has at least one manager and a small labor force. The national rice research program includes

various phases of varietal development, seed purification, fertility, cultural, disease and entomological studies. The applied projects are directed toward varietal evaluation, fertility, insecticide and herbicide studies in support of production requirements. The general lack of trained field staff limits the amount and credibility of the research conducted at field locations.

Rice seed multiplication is an additional phase of the seed purification program which could be expanded and improved. Presently, there is no established means for supply and maintenance of pureline breeders seed for use in the production of foundation seed. Seed which is presently released to contract seed producers is subsequently distributed to growers and is not maintained in a purification program. The seed production program should be improved and streamlined so as to establish a system for a future certified rice seed program.

The Agriculture Extension Service and the Agriculture Information Service were established in Vietnam in 1954. These two agencies of the Ministry of Land Reform and Agriculture are responsible for providing the informal out-of-school farmer education and technicians' training in support of the Ministry's programs. Both of these Services are part of the Directorate General of Agriculture. They are two distinct Services but cooperate closely on the design, production and dissemination of agricultural extension/information materials.

The Agriculture Extension Service is divided into three bureaus -- agriculture, youth and rural women. Representatives of these offices are located in the provinces as part of the Provincial Agriculture Service Chief's Office. As support agencies, the Extension and Information Services provide specialized assistance in terms of hamlet-level farmer education and widespread information dissemination for all agricultural programs.

The success of the Accelerated Rice Production Program is in large part a result of effective extension work at all levels and finally the willingness of farmers here to risk growing the new varieties. Mass media techniques were used extensively to convince the farmers of the personal benefits to be derived from trying IR-8 and IR-5.

A special series of coordinated rice educational materials was designed and distributed by the GVN Extension Service and USAID advisors. These included 20,000 illustrated booklets for use with the 10,000 one-tenth hectare rice kits, 16,000 IR-8 and 5 rice plot signs, 15,000 motivational wall posters, 75 sets of colored slides, 500 technicians' flip charts for teaching, and 100,000 very simple farmers' leaflets. Later improvements and reprints were made of most of these items. Frequent radio tapes prepared by the Agricultural Information Service, newspaper stories, and well-publicized visits by high-level government officials to rural areas also helped to keep interest in the new rice at a high level.

Particular emphasis was given to two points in reference to the new rice; that it would at least double existing yields and that it had already done so in Vietnam.

Farmers were "sold" on the new rice varieties, however, not so much as the result of any single factor, but rather by the combined effect of the entire extension publicity campaign.

Because of the loss to the Army of trained technicians both from the national and provincial extension offices, the level of competence is getting seriously thin. In-service training programs for those extension workers remaining as well as better education materials, and just recently arrived portable visual aid units, are being used to increase the general effectiveness of the extension field workers.

(2) Credit -

Institutional agricultural credit in Vietnam is provided principally through the Agricultural Development Bank. The ADB is a chartered bank under the control of the officially appointed Board of Directors which is chaired by the Minister of Land Reform and Agriculture. There are 41 branches or sub-branches serving the 44 provinces of the country. The ADB central office is in Saigon. The bank's regular personnel staff approximates 600 employees and its present capitalization is approximately VN$458 million. It has a total available loan fund of about VN$3 billion.

The ADB has three major loan programs: (1) conventional bank loans from the bank's own capital, (2) commercial credit for fertilizer and pesticide importers and distributors from funds on loan to ADB from joint GVN/USAID controlled counterpart funds, and (3) production loans to farmers from a variety of earmarked funds provided from both GVN and counterpart sources.

Conventional bank loans are made to applicants who reside in secure areas and who are able to post collateral security. Commercial traders, located in province or district capitals, are the principal clients for this type of credit. However, loans from this source are being issued in increasing numbers to large farm operators.

In 1967, a Fertilizer Credit Fund (FCF) was established with an authorized capitalization of VN$1 billion for loans to fertilizer importers and distributors. The fund was established principally as a credit source for the National Farm Organizations which did not qualify for credit from commercial banks in the quantity necessary for the volume of fertilizer trade which they were capable of servicing. While priority is given farm organizations, loans from the FCF are also made to other private fertilizer traders, particularly to the commercial distributors and dealers in the provinces.

The interest rate on FCF loans to the national farm organizations has been gradually increased and as of January 1969, its rate is comparable to the prime rate prevailing in commercial banks. Pesticides were also added as a commodity eligible for financing from the FCF as of January 1969.

Agricultural production loans are made for supervised credit, swine, water pumps, seed, rice, rubber, pacification, storm recovery, pacification, etc. Of the approximately 60,000 loans issued for all these purposes in 1968, about 10,000 were issued for the production of IR-8 and 5 rice.

Applications for rice production loans in 1968 were obtained by Agricultural Service personnel and forwarded to ADB for review, investigation and approval or disapproval. There was insufficient effort to clearly and convincingly explain to the Agricultural Service personnel that the loan program was not another official soft loan program whereby losses would be generally written off as a pacification loss. The flood of loan applications during the short period allowed for processing exceeded ADB's capacity to fully investigate all applicants. A calculated risk was accepted by the bank and province offices were advised to issue loans to all applicants who had no record of default or other impairment.

In 1969, both the Ministry of Agriculture and the ADB have established a firm policy that no loans are expected to be written off for political purposes and have instituted training programs and operating procedures which are designed to effect administration of the loan program in the manner intended.

A joint GVN/USAID study group was recently organized to consider means to consolidate the agriculture production loan funds to give the bank more flexibility in the use of its total loan portfolio. The group will also be responsible to estimate the total credit requirements estimated for future needs of farmers, fishermen and agribusiness interests for production inputs and marketing facilities.

Of this total credit, an appraisal will be made of the quantity which normal commercial banking institutions can be expected to provide and the quantity which must come from other sources, presumably official and quasi-official agencies such as ADB, if economic, particularly agricultural, development is to proceed at its potential pace.

The amount of credit required for farm, fishery and agri-business needs in Vietnam is estimated at 15% of the gross value of agriculture and fishery production. At the 1968 estimated values of VN$100 billion for agriculture and VN$37 billion for fishery products, it is appraised that the total credit needs were approximately VN$20.5 billion from all sources. ADB issued loans during this period of approximately VN$4.6 billion.

The study group will make recommendations on the source of funds for the credit required, in addition to commercial sources, and the institutional changes needed to administer this increased credit. The ADB was strained to administor its loan portfolio in 1968 due to an insufficient number of trained personnel and to inefficient data processing. A pilot project for automatic data processing is presently underway at ADB to develop and adopt the processing procedures prior to extension of the new system throughout ADB's operations.

(3) Distribution system - fertilizer, etc. -

The Government of Vietnam, with urging from USAID, was in the process of transferring fertilizer importation and distribution from government to the private sector before the IR-8 program was initiated. In early 1968, there was still some fertilizer in the hands of the Agricultural Development Bank, the government agency that had been the importer in the previous year. The complete transfer of fertilizer distribution and sale to the private sector took

place during the 1968 rice crop year. No adverse effect was felt in the rice program from this transfer. Further, it is expected that considerable advantages will be gained in the years to come by having fertilizer importation and distribution in the hands of the private sector.

Fertilizer has been imported under an exchange rate of VN$75 to US$1 in contrast to the prevailing official exchange rate of VN$118 to US$1. The favored fertilizer exchange rate was established in 1967 to permit fertilizer prices to reach a level at retail that would make its use economic on paddy at the depressed prices then prevailing. As the subsidy on imported rice is decreased and prices Vietnamese farmers receive for locally grown paddy are again allowed to reach levels competitive with imports, the fertilizer exchange rate will be increased accordingly until it reaches the official exchange rate.

BHC systemic granular insecticide was imported by the Government of Vietnam. USAID financed the importation as a grant for use in the 1968 rice program. In recent years, most agricultural pesticides have been handled by the Plant Protection Service of the GVN. Effective January 1, 1969, the GVN discontinued retail sale of pesticides and made all remaining stocks, except for a small quantity retained for research and extension use, available for sale to the private trade.

The private sector has declined the opportunity to import and sell systemic granular insecticides used in the rice program. The trade was reluctant to accept the risk involved in the importation of the large tonnages of these insecticides required for the planned hectarage in 1969. The reason given was that the insecticides had only been introduced in Vietnam the previous year and were not proven as marketable. The importation of these systemics for the 1969 rice production program will be by the government but retail distribution will be through the private sector. To the greatest extent possible, this retail distribution will be channeled through the farm organizations.

Other rice production items such as farm implements, sprayers, irrigation pumps, etc. are generally available through private channels in Vietnam, however, there is no vigorous agri-business promotion of sales in the rural areas. Expansion of trade in these items would normally not increase until farmers had a definite increase in income potential or experienced a rise in the cost of labor. Both have developed with the advent of IR-8 and 5 rice and the drain of labor from the farms to higher priced jobs associated with the war effort in the cities. Expansion of trade in mechanical farm equipment is expected to follow the increased hectarage of IR-8 and 5 to be planted.

(4) Marketing and storage -

Marketing and storage of rice and other grains in Vietnam follows the traditional Asian pattern of middlemen and production credit is often tied to marketing arrangements. Rice mills are old and inefficient and storage is poor. The massive importation of rice into the country has provided a new dimension to this situation. Approximately 200,000 MT of milled rice are stored under government control in the Saigon/Cholon area. The government moves rice to the production deficit areas of central Vietnam at subsidized prices. To what degree this situation has disrupted normal channels of handling, storage and marketing rice is not specifically known.* Rice prices are watched carefully by the USAID staff and as previously mentioned, USAID has been successful in getting the GVN to raise prices of imported milled rice so as to effect some paddy price support for the Vietnamese farmers. A comprehensive survey of grain storage, handling and marketing with emphasis on rice has just been approved. This survey is USAID sponsored and will be conducted in cooperation with the Ministries of Agriculture and Economy. It will cover all aspects of storage, handling, processing and marketing of rice in addition to other grains.

*particularly since the subsidy has been reduced to a minimum level.

b. Importance of formal institutions and their combined effect:

The spread of new varieties during 1968 in the planting of 44,000 hectares could not have been achieved so successfully without the existence of several GVN government institutions and the existence and support of the private sector participating. One particular institution which made a significant contribution was the Fertilizer Distribution Center. This is a group which represents the fertilizer trade. Officials of the FDC listened sympathetically to the problems of fertilizer distribution in those provinces participating in the rice production program. With GVN/USAID urging, the FDC took the measures necessary to assure that fertilizer would be available in these provinces insofar as possible.

The Plant Protection Service of the MLRA, already a principal distributor of pesticides, assisted in the distribution and extension of information necessary to introduce the new systemic granulars.

The Agricultural Development Bank geared up a program of extending credit on an accelerated basis to a large number of the participating rice farmers.

The Extension Service of the MLRA worked in close cooperation with the Rice Service in providing extension and information materials and in the establishment of the National Rice Production Training Center. All institutional efforts were coordinated through a GVN/USAID Rice Committee.

The program was worked out strategically on a time frame using the PERT/LOB management techniques. This assured appropriate coordination, provided advanced information on problems, and the timely evaluation of what had been done and what needed to be done by participating agencies, institutions or persons.

In addition to the cooperation with the GVN by its agencies and the private sector, USAID offices and the CORDS organization cooperated closely on various actions to support the

program. For example, USAID's Logistics Office in the movement of seed, Air America in the movement of people, CORDS telegraphic and reports network plus field agriculture staffs, and JUSPAO in the preparation of some of the motivational posters, etc.

e. Adequacy of existing institutions, special plans, activities:

The GVN Ministry of Agriculture and its Provincial Agriculture Services were equipped to support the Accelerated Rice Production Program when it was started in January 1968. In fact, the existence of the MLRA's organizations and institutions made the program possible. It should be noted, however, that slightly after mid-year of 1968, the government organization was modified and improved through the consolidation of services at the provincial level.

It was considered that the Agricultural Development Bank would have to have additional staff immediately to process applications for crop production loans. When a decision was made to suspend the farm plan budgets, this lessened the credit administration burden but of course this action also cancelled the opportunity to collect economic profile data on the individual farmers. The loans really consisted of loans in kind. Seed and pesticides were distributed directly from the agricultural service extension workers. Farmers were required to sign a promise to pay for the loans, however, the actual collection of most of these is not yet completed. No evaluation can be made at this time as to the success of the credit aspects of the program.

Research, extension and a large portion of the credit institution had been in operation for more than ten years. All of these received substantial AID support - in fact, AID played a vital role in the establishment of these institutions. It also had helped establish 4-H type clubs and extension home economics both of which gave substantial support to the acceptance of the IR-8 and 5 program. A special rice committee was formed jointly by GVN and USAID/Agriculture to plan, coordinate

and manage the program. Vietnamese and U.S. technicians were given special short-course training at IRRI and the Hawaii Rice Training Center. A National Rice Production Training Center, located near Bien Hoa 15 miles north of Saigon, was established to train additional Vietnamese extension workers.

Special packets of technical information were prepared concerning land preparation, seeding, fertilizers, irrigation and plant protection which outlined nineteen steps in producing the new varieties.

Fertilizers, pesticides and credit funds were allocated to support the program. Ten thousand rice kits were assembled which contained the seed, fertilizers, and pesticides for planting one-tenth hectare plots (about ¼ acre) and sold to farmers and 4-T Club members.

d. Role of domestic and foreign agri-businesses:

Private dealers of seed in the Philippines provided the IR-8 and 5 seed through contract. Pesticide dealers in Taiwan provided some of the systemic granular pesticides; the balance came from the United States. Farmers organizations and fertilizer distributors in Vietnam cooperated with the MLRA in support of the rice program. A private company in Vietnam prepared the seed planting kits, assembled and warehoused them pending their distribution. Following the GVN distribution, private businesses purchased the remaining kits and distributed them.

The Fertilizer Distribution Center, a consortium of private distributors, assigned individual responsibility to its various members to supplement the existing commercial supply of fertilizer in each province to a quantity level adequate for the hectarage targeted for IR-8 and 5 plantings in the first crop in 1968. The FDC, which was composed of the three national farm organizations and a combination of several large commercial distributors, was active in this function principally in

these provinces where fertilizer volume, up until that time, was relatively low. In these provinces, there had been less economic incentive for the use of fertilizer due to the high cost of transport to remote areas.

The FDC, which was organized to meet the specific problems involved during the transition from a government import system to an all commercial import and distribution system in early 1968, became inactive by the fall of 1968. However, by that time, a distribution system had developed in the remote provinces with reasonably satisfactory capability to handle the fertilizer supply needs for the fall IR-8 and 5 plantings.

The fertilizer volume required for support of the IR-8 and 5 plantings in 1968 represented about 5% of the total fertilizer volume in the period.

Among the other production inputs, pesticides were imported, distributed and sold by the government for the first planting of IR-8 and 5 but the government stocks were distributed and sold exclusively by the private traders for the fall plantings. As mentioned previously, the private trade will assume responsibility for the importation and distribution of agricultural pesticides after January 1969 except for the systemic insecticides required for the 1969 rice plantings.

e. AID's role in supporting these institutions:

AID has supported and encouraged the growth of agri-business in Vietnam for several years. The Government of Vietnam has taken a position with respect to supporting a specific program on an accelerated basis by enlisting the support and cooperation of the private sector. This has been particularly true in fertilizer and pesticides. In addition, the Government of Vietnam is officially sponsoring a study which could lead to the establishment of a private rural bank system and an improved grain storage, handling and marketing system. USAID has offerred support to these endeavors.

As previously mentioned inthis report, AID/Washington should give considerable attention to the policies which LDC governments follow with respect to the development of private business institutions; also to the capability of LDC universities to conduct research in agriculture. One very important point is that farm management contracts and the private sector sale of pesticides and fertilizers, farm implements, etc. can provide extension services to farmers in addition to those provided by the government. The most important thing is that this kind of extension service by sales representatives of agri-business companies is free to the farmer and does not cost the government for its administrative support. It is for this reason that AID/Washington should support a vigorous program to develop independent and private agri-businesses in LDCs with whom AID has cooperative programs. This should be a primary policy of AID/Washington.

4. Policy aspects:

a. In 1967, the GVN rice research officials were reluctant to bring any large quantity of the new varieties into the country until further research was done on adaptability and whether susceptible to local diseases and insects. This was changed after the Vo Dat farm plantings in Binh Tuy Province and a visit to the Philippines by the Minister of Agriculture in late 1967.

(1) After these changes, there was full encouragement of the use of the new varieties by GVN.

(2) The government bought some of the seed produced in Binh Tuy Province and gave full support to the import of seed and other inputs.

(3) The government was already subsidizing fertilizers and pesticides but made special allocations of these and credit funds to support the new rice program.

b. The U.S. policy change of the LDC food problem did not have significant effect on GVN.

USAID officials encouraged the introduction of the seed and paid for the imported seed from the Philippines. AID brought in the new systemic insecticides and fertilizers and assisted in the promotion campaign.

c. Conclusions based on above.

USAID/Vietnam believes that it is possible to introduce a program of increasing production by using new varieties if the conditions outlined on pages 1 and 2 are satisfied.

Where AID is involved in supporting such a program, it must have close working relationship at the appropriate policy level with the government officials involved. There must be mutual respect and understanding. The program must be cooperative but basic responsibility for final decisions on policies and implementing procedures should stay with the host government.

AID must make it known to the host government that it is willing to support the program, specify what that support will be, and negotiate an agreement accordingly.

No program should be started until there is absolute conviction on both sides that it can work and will be made to work.

The success of this rice production effort in Vietnam was not affected by the PL 480 program.

5. Operational problems encountered:

a. The Accelerated Rice Production Program in Vietnam presented no very difficult operational problems insofar as USAID's participation was concerned. When program implementation was started in January 1968, USAID had in Vietnam sufficient

organization and staff to carry out its cooperative and contributive effort. There were at the time approximately 30 technicians assigned to the Rice and Crops Division. These included agronomists, entomologists, soils and seed specialists, crops researchers, extension specialists, youth and home economics advisors as well as farm mechanization and irrigation engineers. Some minor adjustments and shifts in personnel were made to take advantage of special technical or administrative abilities considered necessary for program implementation.

In the field, the CORDS organization had a large contingent of U.S. agricultural advisors at the province level to assist the GVN field organization. Most of the U.S. agricultural technicians had had short training courses on rice production techniques at IRRI or Hawaii before coming to Vietnam. In late March 1968, the Rice and Crops Division was organized into four branches as follows: Extension and Information (6 technicians), Agri-Production (6 technicians), Agronomy and Research (5 technicians) and Agri-Engineering (6 technicians). There has been a gradual reduction effected by attrition or reorganization to where the personnel on board count now is 12 technicians. The skills needed for a USAID Mission to support this type of program include an administrative or program manager who has field experience, is resourceful, persuasive and innovative; a deputy to the manager or a chief of the production program who is technically qualified in the agri-business, fertilizer, pesticides, credit and other input requirements; an imaginative and self-starting extension/information chief is vital to the success of the program and he must have an adequate staff. An agronomy and research chief is highly desirable. He should know the crop being grown and be able to evaluate the usefulness and applicability of existing research data and help the host government officials relate and apply it to the program. He must also know how to organize adaptive research and field trials. Farm machinery and irrigation technical assistance is needed and plays a very important role but the lead time to make this input useful to an impact project makes the input marginal. The staff effort here should be considered in terms of the long range potential and to sustain and support the growth of the program after it is started.

USAID/Vietnam is a very large organization, consequently, regularized procedures must be followed in order to assure orderly and coordinated programming. This, of course, can slow down accelerated projects such as the rice program. The GVN was not always capable of responding to accelerated actions. This was particularly true due to military requirements in obtaining clearance of people for special out-of-country training. USAID/Vietnam, the CORDS organization and the GVN did work out most problems and kept to target schedules. The TET offensive and other special Vietnam problems encountered and their resolution would not have particular applicability in other countries. What is important is that the GVN, USAID and CORDS did recognize the program as one of the highest priority, consequently, problems which developed or were anticipated by the PERT management system, were quickly and easily resolved. As in any program, effective personal relationships, efficient inter-office procedures and reciprocal working arrangements with the host government officials are of vital importance.

b. There were no additional personnel requirements needed.

c. The program started with the Minister of Agriculture himself. For the first several months, he kept in almost daily contact with appropriate USAID representatives on problems and progress. The Director General of Agriculture was the principal policy level counterpart for the rice program. He is responsible for the Rice Service, the Extension/Information Services, Crops Production, Plant Protection, etc. He is a member of the Minister's policy council and the joint USAID/GVN Fertilizer-Pesticide Policy Committee. In addition to almost daily meetings between the USAID technical staff with their GVN counterparts, regional rice production meetings were held at intervals of about every six weeks in all four regions. These meetings were almost always attended by the GVN Director General of Agriculture, USAID's Assistant Director for Rice and Crops, the Assistant Director of the Agricultural Development Bank, the Chief of the GVN Rice Service, the Chief of the GVN's

Extension Service, and two or three corresponding counterpart members of USAID's Rice and Production Support Divisions. The CORDS regional personnel, all USAID/CORDS provincial agricultural advisors and the GVN provincial agricultural service chiefs and ADB branch directors from the provinces also attend the meetings.

Regular periodic meetings of this type on agriculture have never been held in Vietnam before. These combined GVN/USAID meetings permitted on-the-spot decisions and the immediate resolution of problems. Following the meetings - memos were sent out in Vietnamese and English to summarize discussions, outline policies decided upon, interpret policy, etc.

A series of Rice Memos was instituted by USAID to the CORDS field staff. This carried technical and policy information to the field. In addition, reports system from the field provides USAID information on program progress and the analysis of the information is also used for program evaluation and planning.

d. There were no dollar funding problems. While the ready availability of local currency is becoming a problem in Vietnam, it has not yet had any adverse effect on the rice program.

e. AID/W imposed no requirements which were unnecessarily complicated or burdensome.

6. Supply of physical inputs:

a. The provision of the necessary requisites for the program had no measurable effect on the GVN's balance of payments or on its budget. The introduction of the IR-8 rice production program did accelerate the transfer of the import, distribution and sale of fertilizer and pesticides from the government to the private sector.

b. It is believed, by USAID, that if a price support policy and commodity loan program were instituted by the GVN, it could greatly accelerate the rice self-sufficiency program in Vietnam. Generally speaking, GVN policies have been favorable. For example, steps were taken by the government to purchase some rice in the Delta, the price of Title I rice was raised, and stock transfer actions to move rice from the Saigon warehouses to the central regions of Vietnam were made.

c. The supply of the seed, fertilizer and pesticides necessary to initiate the program was made available principally through USAID's resources. USAID financed the foreign exchange cost of approximately 3,200 tons of systemic pesticides, which had a value of $1.7 million. It financed, as a grant, the importation of 45 MT of IR-8 rice seed for the Vo Dat support effort in October 1967 plus another 2,000 MT of IR-8 seed for the 1968 44,000-hectare production program. A small quantity, (5 MT) of IR-5 seed was also imported in 1968. The value of all imported seed was in excess of $450,000. USAID also agreed to a counterpart fund of VN$250 million to permit the ADB to make special rice production crop loans to support the accelerated rice program.

7. Problems of "trade-off":

There has been no measurable trade-off to other programs. Reduced support for or production of other crops as a result of the accelerated production of rice has not occurred. In fact, as previously mentioned, the rice program may very well be an important stimulus to increased production of other crops.

Farmers' belief in and increased use of modern farming practices and inputs such as fertilizer, pesticides, etc. as well as increased reliance on improved management concepts by responsible officials are some of the benefits derived from the rice program which account for this stimulus to other crop production efforts.

While there were no particular losses to other programs, there was a conscious decision to focus management attention on a rice program and to reduce attention to other activities if that was necessary.

8. Overall socio-economic and political impact:

a. It is too early to determine to what degree there has been an increase in Vietnam's GNP as a result of this program. As previously explained, IR-8 has increased the rice production of those farmers growing it up to three-fold and within the next two years, it is expected that three to five hundred thousand farmers will be growing the new rice.

b. There is no reported effect on the GVN's balance of payments from the program thus far.

c. If a commodity loan program is instituted, the farmer can take additional advantage of this rice production effort by sharing in some of the marketing profits which are available. USAID is pursuing with the GVN the desirability of establishing a sound price support policy and a related commodity loan program.

USAID will also support the development of other institutions such as rural banks and stimulate further the spread of agri-business and private investment in the rural areas of Vietnam.

d. Recently, the Prime Minister designated the growing of IR-8 and land reform as high priority programs. It is hoped that with multi-cropping and more scientific farming, farmers who are to move from tenancy to leasehold or full ownership will have better means of becoming viable producers with the land that they acquire.

e. It is believed that farmers who own their own land, grow crops efficiently, and increase profits and disposable income will respond to pacification efforts, join in democratic processes and thereby influence political stability.

9. Self sufficiency:

a. See Appendix A which presents the hectarage under cultivation for rice and the combination possibilities for self sufficiency using IR-8 and 5 and local varieties. As previously mentioned, there will be an effort to develop multi-cropping insofar as possible and inter-cropping wherever feasible.

b. An accelerated grain sorghum production program and soybean production program could be initiated in the very near future. Both of these are needed to support the increase of animal protein production. In addition to domestic requirements, Vietnam has potentials for possibilities of export of feed grains to Japan and Hong Kong. When the war is over, the country also has potentials for developing an export banana industry and possibly even some spices. In addition, sugar and rubber can come back to their own at the cessation of hostilities.

V. No remarks are provided for Section V as this is for a summary by AID/W.

SUMMARY:

An accelerated rice production program using the IR-8 and 5 varieties has been successfully implemented in Vietnam. Key factors in the program were (a) enthusiastic support of GVN officials at all levels, (b) existence of appropriate host government institutions, (c) adequate funding, personnel and material inputs, (d) use of a systematic management plan for program implementation, and (e) substantial support and involvement of the private business sector.

A "package" approach was used in the Vietnam rice production effort. In this type of program, it is not felt that one element alone, such as the improved seed, can make the significant impact necessary to bring about the desired production increase. In introducing a new crop variety on a wide scale and within an accelerated time frame, the coordinated "package" plan is believed to be necessary. As an integral part of the program, of course, a management system is essential. This crucial ingredient, management, cannot be left to chance or exclusively in the hands of discipline-oriented specialists.

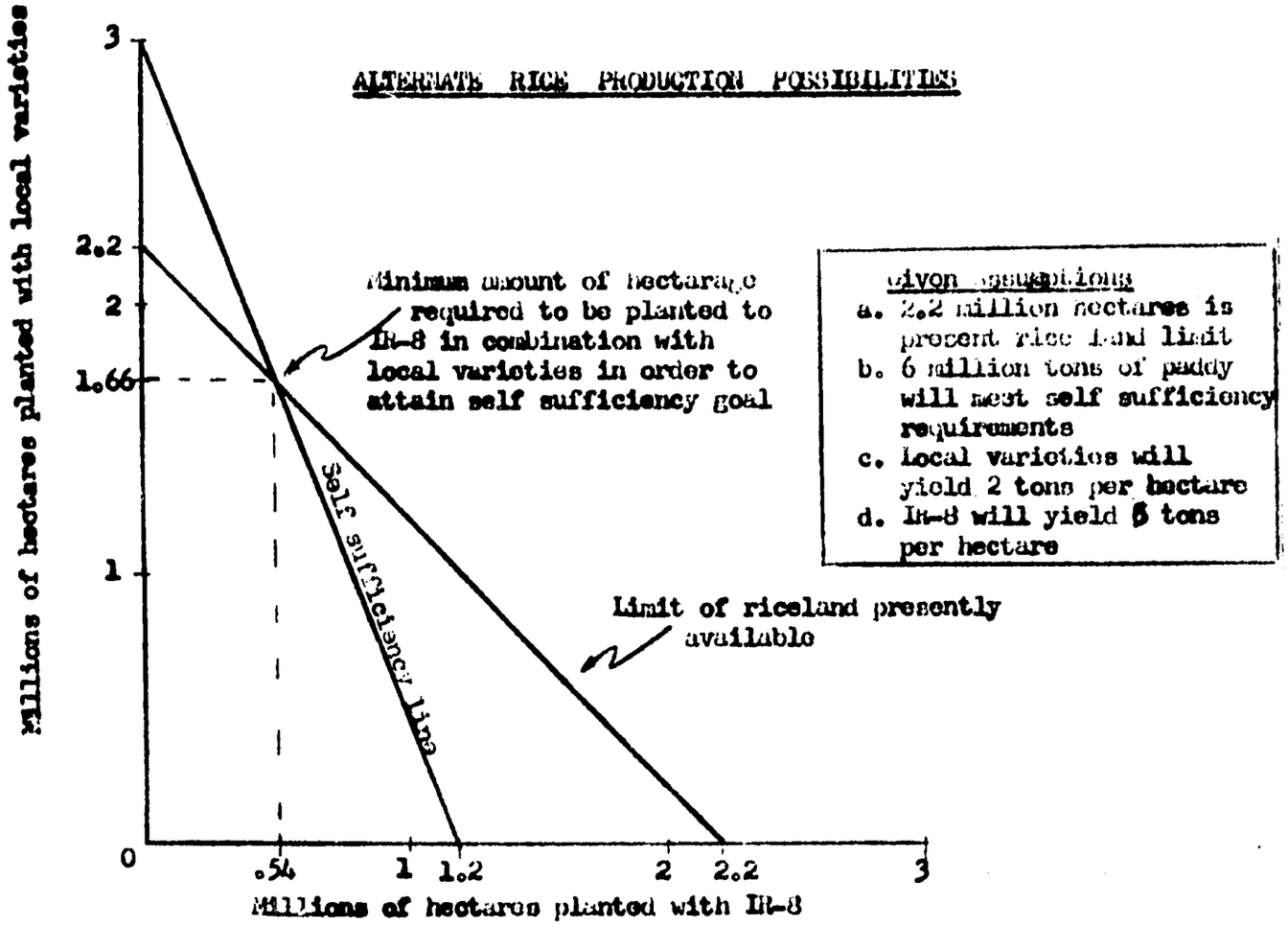
In looking to the future on a broadened scale, modernizing and streamlining the marketing, handling and storing of rice and other grains in Asia is of vital importance. This subject deserves full AID support so that rice and other grain requirements in Asia, as well as other parts of the world, can be projected for the next ten years. AID's food programs in the LDCs and

U.S. agricultural policies are closely linked and should be formulated on the basis of hard fact projections of need. AID should sponsor and participate in regional and international studies and conferences to define problems and develop policies and guidelines necessary for more effective and better coordinated food production programs.

Vietnam must immediately look beyond the IR-8 and 5 varieties. These varieties have already served their purpose. They introduced a new era and technique in Vietnam's history of rice production. IR-8 and 5 can be thought of as the model "T" rice. Research is presently developing other varieties with increased disease resistance and better milling and eating qualities. Vietnam, and other LDCs, must concentrate on doing the necessary adaptive research and for the immediate future lessen heavy involvement in pure research efforts per se.

AID should, as a matter of policy, vigorously encourage the development of the private sector in each cooperating LDC. Agricultural development needs the services that only private business can supply effectively and efficiently on a sustained basis.

APPENDIX A



Given the assumptions above, the limit for planting all combinations is fixed by a line drawn between the 2.2 marks on the scales. At one extreme we could get 11 million tons by planting everything to IR-8. At the other limit we can only get 4.4 million tons by planting all hectarage to local varieties. Since the output of IR-8 is higher than traditional rice, in order to attain self-sufficiency goals under extreme situations, would require 3 million hectares of local varieties, or 1.2 million hectares of IR-8. Thus any combination on this line will meet the goal. Combinations inside this line will be insufficient; combinations outside this line (i.e. to the right of the line) will produce a crop surplus.

VIETNAM RICE PAPER

Additional Comments

April 25, 1969

(AID/W questions shown first. USAID response follows.)

1. PACKAGE PROGRAM. WERE THE 10,000 PACKAGES DISTRIBUTED FOR FIRST CROP? DOES THIS IMPLY 10,000 OUT OF 22,000 FARMERS WERE "PACKAGED"? DID THESE 10,000 PLANT ONLY ONE-TENTH HECTARE EACH, AND REMAINING 12,000 "UNPACKAGED" FARMERS PLANTED REMAINING 22,000 HECTARES? HOW MANY OF 10,000 WERE 4-T? WE ARE PROBING FOR THE IMPORTANCE OF "PACKAGE" PROGRAM IN EXPLAINING RAPID ADOPTION.

PACKAGE PROGRAM. TEN THOUSAN KITS PREPARED; 5,000 EACH IR-8 AND IR-5. APPROXIMATELY 8,000 DISTRIBUTED FIRST CROP WITH BALANCE BEING USED FOR FOLLOWING PLANTINGS. THIS DOES NOT IMPLY THAT 10,000 FARMERS "PACKAGED" BECAUSE IN MANY CASES FARMERS USED KITS AS WELL AS PLANTING NEW VARIETIES OUTSIDE OF KIT PROGRAM. 22,000 FARMERS PARTICIPATING PROGRAM IS GROOS ESTIMATE; DATA AS TO NUMBER OF HECTARES ACCOUNTED FOR BY KIT OR NON-KIT FARMERS NOT AVAILABLE. UNABLE TO DETERMINE NUMBER KITS DISTRIBUTED TO 4-T MEMBERS. FIELD REPORTS INDICATE SEVERAL HUNDRED USED THIS WAY AND THAT KITS HIGHLY ACCEPTABLE AS 4-T CLUB PROJECT. IN OUR JUDGMENT, KIT APPROACH IMPORTANT AS A MEANS OF RAPIDLY DISSEMINATING NEW VARIETIES AND IN EXPLAINING RAPID ADOPTION. IMPORTANCE OF KITS SHOULD NOT BE VEREMPHASIZED, HOWEVER, AS THEY WERE PART OF A COORDINATED, LARGE SCALE PROGRAM.

2. EXTENSION. WERE THE 10,000 PACKAGES DISTRIBUTED BY EXTENSION SERVICE? ESTIMATE PERCENTAGE OF 22,000 FARMERS WHO WERE CONTACTED AND/OR INFLUENCED BY EXTENSION. DID EXTENSION PLAY "NECESSARY" ROLE?

EXTENSION. AT OUTSET OF PROGRAM ALL AGRICULTURAL PERSONNEL AT PROVINCE LEVEL UNIFIED UNDER ONE HEAD. ENTIRE FIELD FORCE WAS MOBILIZED TO SUPPORT RICE PROGRAM. MANY TECHNICIANS NOT FORMALLY MEMBERS OF THE EXTENSION BRANCH WERE INVOLVED IN EXTENSION EDUCATION. ALL KITS WERE DISTRIBUTED BY THIS RECENTLY COMBINED PROVINCIAL AGRICULTURAL OFFICE. ESTIMATE THAT ALL PARTICIPATING FARMERS WERE CONTACTED AND/OR INFLUENCED BY MEANS OF ONE OR MORE EXTENSION METHODS. MASS PRINTINGS OF LEAFLETS, BROCHURE, WALL POSTERS AND FLIP CHARTS AS WELL AS RADIO PROGRAMS AND FARMER MEETINGS PROVIDED THOROUGH COVERAGE FOR THE PROGRAM. THE EXTENSION ROLE WAS NECESSARY.

3. CREDIT. WERE THE 10,000 AGRICULTURE PRODUCTION LOANS ISSUED TO THE 10,000 "PACKAGED" FARMERS? ESTIMATE PERCENTAGE OF 22,000 FARMERS WHO USED CREDIT FOR IR-8.

. CREDIT. 10,000 AGRICULTURAL PRODUCTION LOANS NOT ISSUED TO 10,000 FARMERS USING KITS. APPROXIMATELY 50 PERCENT OF 22,000 FARMERS PARTICIPATING USED CREDIT.

4. FERTILIZER. ESTIMATE PERCENTAGE OF IR-8 FARMERS WHO WERE SUPPLIED BY FERTILIZER DISTRIBUTION CENTER.

FERTILIZER. THE FDC WAS AN ORGANIZATION FORMED PRINCIPALLY AS A HANDLING AGENT FOR THE PURCHASE AND WHOLESALE DISTRIBUTION OF 1967 CARRY OVER STOCKS. THE ORGANIZATION NEVER OPERATED AS AN ENTITY IN ANY OTHER CAPACITY ALTHOUGH INITIALLY THERE WAS POSSIBILITY THAT IT MIGHT EXTEND OPERATIONS TO OTHER FUNCTIONS. RETAIL DISTRIBUTION WAS HANDLED BY INDIVIDUAL RETAILERS OR FARM ORGANIZATION UNITS. A ROUGHO ESTIMATE OF THE FARM ORGANIZATION SHARE OF THE FERTILIZER SOLD AT RETAIL TO GROWERS OF IR-8 RANGES FROM 40 TO 50 PERCENT

5. DISCRIMINATION. WHAT WAS TYPOLOGY OF 22,000 FARMERS, OF 10,000 "PACKAGED" FARMERS? WERE THEY TYPICAL, OR PREDOMINATELY THE LARGER, PROGRESSIVE FARMERS? ESTIMATE PERCENTAGE FOR WHOM IMPROVED RICE TECHNOLOGY WAS NEW EXPERIENCE.

. DISCRIMINATION, 10,000 KIT AND OVERALL PRODUCTION PROGRAM DIRECTED TO ENTIRE COUNTRY WITHOUT REGARD FOR TYPOLOGY OF RECIPIENT. NOT POSSIBLE TO ESTIMATE TO ANY ACCURATE DEGREE PERCENTAGE OF FARMERS WHO HAVE HAD PREVIOUS EXPERIENCE IMPROVED RICE TECHNOLOGY.

6 OTHER ?

. TOTAL NINE INSTITUTIONS INVOLVED RICE PROGRAM OF WHICH ONE, THE NATIONAL RICE PRODUCTION TRAINING CENTER, WAS INITIATED AS RESULT OF THE PROGRAM. INSTITUTIONS IN VIETNAM WERE ESSENTIAL TO PROGRAM SUCCESS.

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IAY 1962 EDITION
SA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Mr. Edward B. Rice, PPC/POL/ES
Room 3883 NS

DATE: April 23, 1969

FROM : Carl F. van Haeften, WOH/ARDS

SUBJECT: Comments on Spring Review and Crop Paper for Accelerated (IR-8 and 5) Rice Production Program in Vietnam.

Ref: Saigon TOAID A-1357 3/12/69

As per your request, I have reviewed subject report which was prepared by USAID/Saigon and forwarded to AID/W as an attachment to reference airgram.

The report appears to be accurate and complete with respect to the execution of the accelerated rice production program in Vietnam, but only for the period subsequent to January 1968.

The report makes no mention of the principal factor which caused the so-called "breakthrough" nor are the comments concerning GVN and USAID actions during 1966 and 1967 accurate, complete or properly time phased. In fact, the report at times leaves the impression that USAID efforts to support an accelerated rice production program only began in late 1967.

I was the senior agricultural officer in USAID/Vietnam from December 14, 1965 to January 20, 1968, and the accelerated rice production program was conceived, planned and launched during my tenure of office.

The real "breakthrough" occurred in early 1967 when the rice stocks in Saigon were suddenly depleted and the price of rice increased three fold in a matter of days. During 1966, farmers received about $40 to $50 for a metric ton of paddy. Using world market prices as a reasonable standard for comparison, the Vietnamese farmers received only 40% of the legitimate value of the rice. At that price level, rice farmers followed subsistence practices. Following the sudden rise in the retail price of milled rice in Saigon in early 1967, farmers soon

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

began to receive as much as $100 per metric ton of paddy. This represented the "breakthrough" needed to creak an incentive for farmers to adopt modern practices to increase rice production.

Throughout 1966 the USAID Office of Agriculture made every effort to achieve this "breakthrough" as a matter of deliberate policy. With the assistance of USDA experts, a Rice Price Study was initiated in the summer of 1966. At my request, the Secretary of Agriculture made Mr. Roland F. Ballou, Deputy Administrator of the ASCS, available to assist me in presenting the results of the study to the Mission Council. The report was presented to the Mission Council in December 1966 with a recommendation for an immediate increase in the wholesale price of imported American rice. The Mission Council rejected our proposal and decided to continue the existing policy of selling imported rice at a 50% subsidy as a means of maintaining political and economic stability.

The desired policy was achieved a month or so later when Vietnamese merchants deliberately created a rice shortage in Saigon which resulted in a sharp rise in the price of rice. When this price rise did not result in the anticipated rice riots in the streets of Saigon and it did not trigger a general inflationary reaction, the GVN and the Mission Council agreed to take steps to prevent the prices from returning to their previous low levels.

The USAID Office of Agriculture worked diligently throughout 1966 and 1967 towards the development of an accelerated rice production program.

In January 1966, the USAID Agriculture Division consisted of 21 officers, three of which were stationed in the field. None had been trained in rice production. Throughout 1966 and 1967 additional staff was recruited and trained in Vietnamese language and modern rice production. In February 1967, the first sixteen technicians arrived in Vietnam following six months of intensive training including rice production. A second group of 26 men trained in rice production arrived in July 1967. By December 1967, the on board strength of the USAID Office of Agriculture was 233 officers including 58 trained in rice production. At that time, arrangements had also been made for the training of an additional 60 U.S. technicians in rice production during March and April 1968.

The report does reflect USAID and GVN successes in conducting IR-8 trials during 1966 and 1967.

The present fertilizer policy was developed by myself with the assistance of my staff in December 1966 and negotiated with the GVN in early 1967. It was a deliberate policy aimed at getting the GVN out of the fertilizer distribution and getting the commercial distributors back in business following the fertilizer fiasco created by the devaluation of the piaster in July 1966. The entire policy was directed towards creating the infrastructure needed to support an accelerated rice production effort.

The creation of the Agricultural Development Bank was initiated in 1965, planned during 1966 and put into operation in early 1967.

During the same period, the USAID advised and assisted the GVN in reorganizing farmer organizations removing the heavy hand of government and permitting farmers to manage their own organizations. This also was directed towards creating the necessary infrastructure to support a rice production effort.

Following the rice price breakthrough in early 1967, the USAID Office of Agriculture and the GVN Ministry of Agriculture enthusiastically worked towards developing a rice production goal plan.

The Crop Production E-1 prepared in July 1967 budgeted $400,000 to purchase 1,500 metric tons of IR-8 seed. The same E-1 included a detailed proposal and budget for the creation of a rice training center in Vietnam.

At this time, there was still no general support within the USAID for the ambitious rice production program being developed by the Office of Agriculture.

At the Camp Smith meeting in Hawaii in August 1967, I first presented a proposed program for an accelerated rice production program. The staff of the Office of Agriculture had done its homework during the preceeding months and the rice production goal was formally accepted by AID/W and the USAID.

The original plan was to launch the rice production program in the Spring of 1968 and it was to be built around the importation from the Philippines of 1500 tons of IR-8 seed.

The September floods in the Vo Dat valley offered a unique opportunity to speed up the program. At that point in time, the Service Directors in the Ministry of Agriculture opposed large scale introductions of IR-8. We can only guess at their reasons, but the fact remained that the Director of Agriculture and the Chief of the Rice Service opposed the importation of 45 tons of IR-8 seed for the Vo Dat project. The Minister of Agriculture approved the project even in the face of this strong opposition within the Ministry. The Minister of Agriculture, at that time Mr. Lam Van Tri, informed me that he would approve the project as a special favor to me because he had full confidence in the USAID.

In October 1967, a new cabinet was appointed and Mr. Ton That Trink became the Minister of Agriculture. The new Minister was formerly the Director of the Agricultural College and he was already a strong supporter of large scale IR-8 introduction in Vietnam.

Meanwhile, the USAID Office of Agriculture had developed a 160 page rice goal plan which called for an integrated multidiscipline approach to launching an accelerated rice production program.

I gave the Minister a draft copy of the goal plan in November 1967 and he enthusiastically accepted the plan as the primary objective of the Ministry of Agriculture.

The Minister and I jointly arranged for a trip to the Philippines in December 1967 to visit the International Rice Research Institute. The Minister was already sold on the program and the trip to the Philippines in an Air American C-46 was for the specific purpose of taking along the senior staff of both the Ministry and the USAID in order to win over their support.

In summary, the paper submitted by USAID/Vietnam accurately describes the implementation of the accelerated rice production program, and the above comments summarize the actions taken during 1966 and 1967 to lay the foundation. I prepared these comments

on short notice and I have not attempted to cover every aspect of the program. There is one additional point of interest which relates to fertilizer sales and the price of rice.

During 1966, the farmers in the Delta received around 5 piasters a kilo for their paddy and the farmers in the 5 northern provinces of South Vietnam received 12 to 14 piasters a kilo for their paddy. Roughly speaking, there are 200,000 hectares of rice in the five Northern provinces and 2 million hectares in the Delta. During that year, 40,000 tons of fertilizer were sold in the north for cash and only 25,000 tons were sold in the Delta and then on credit. There is also some evidence that the fertilizer sold in the Delta was mostly used for the expanding vegetable production.

Drafted: WOH/ARDS Carl F. van Haeften