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The Impact of the MASAGANA 99 Program on Small Farmer Production and Income in the Philippines

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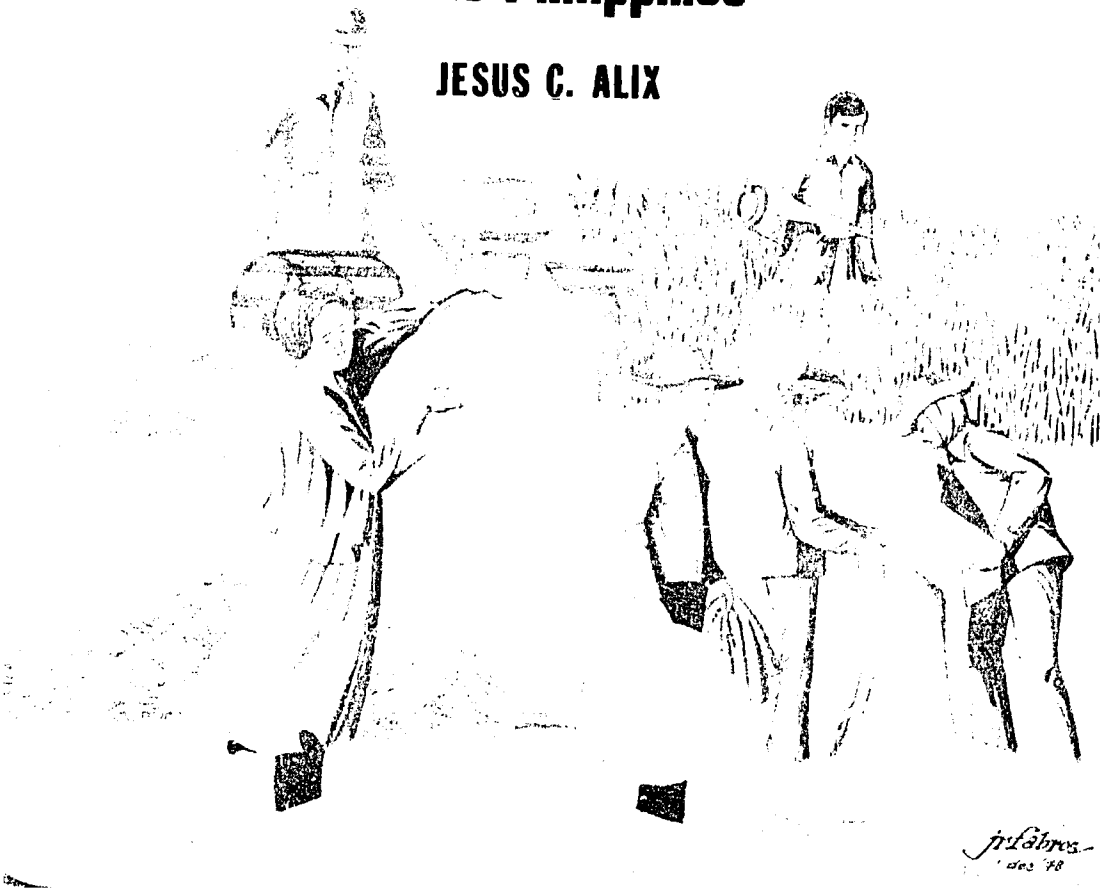

THE IMPACT OF THE MASAGANA 99 PROGRAM ON SMALL FARMER PRODUCTION AND INCOME IN THE PHILIPPINES

JESUS C. ALIX

FOREWORD

The eleventh in the 1978 research report series of the Bureau of Agricultural Economics discusses the Masagana 99 program of the country as it relates to small-farmer production and income, particularly in Iloilo province, Philippines.

The paper was primarily prepared for the Philippine participation at the FAO Workshop on small-farmer development held at Bangkok in January 1979. The author (who is director of the Bureau of Agricultural Economics, and concurrent officers-in-charge of the Planning Service and the Computer Service Center of the Ministry of Agriculture) has written a number of papers on the small-farmer development aspect; and here uses the results of a micro-level study (the USAID/NFAC-supported study on farm record-keeping in Iloilo) to demonstrate the impact of a macro-level program on small-farmer development and growth in the Philippines.

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THE IMPACT OF THE MASAGANA 99 PROGRAM ON SMALL FARMER PRODUCTION AND INCOME IN THE PHILIPPINES

I. INTRODUCTION

This paper will attempt to show the impact of the Philippines' Masagana 99 Program on small-farmer production and income in the country. To best do this will require first some background information on the rice economy in the Philippines, its agro-economic characteristics to reflect the importance of rice to the Filipino people and its role in the economy of the country. Then the reader will understand why governments, in the Philippines and perhaps elsewhere in Southeast Asia, put much stress on the possession of adequate rice stocks, whether produced locally or imported.

A. The Philippines: Agro-Economic Characteristics

The Philippine archipelago is situated just north of the equator in the Asian region, off the southeastern coast of Asia and bounded by Taiwan on the north, Borneo in the south. It has an area of almost 300,000 sq. kilometers or 30 million hectares, composed of 7,100 islands with a population close to 45 million. There are 11 main islands making up 98 percent of the total area. Its climate is warm with distinct wet and dry seasons, and with large variations in rainfall throughout the country.

The country lies in the tropical cyclone belt. From 1900 to 1972 there was recorded a total of 1,533 typhoons, or an average of 21 typhoons a year. Typhoons generally occur between the months of June and November, the period when almost 60 percent of the year's rice output is harvested.

Its economy is still mainly agricultural. About 68 percent of the people live in the countryside; 73 percent of the labor force is in agriculture; and there are 1.5 million rice farmers. Agriculture's contribution to gross national product in 1975 was 27.3 percent while agricultural crops comprised 61 percent of gross value added in fiscal year 1974. Paddy contributed 32.5 percent of gross value added in agriculture.

Paddy, corn, coconut and sugarcane are the main products. Total area planted to crops in 1977 was 11.8 million hectares of which 10 1 million or 86 percent was grown to the four commodities mentioned above. Paddy accounted for a full 30 percent of the crop area harvested. The average paddy farm size is 1.8

hectares with an average production of 1.82 metric tons per hectare (1977).

For roughly 80 percent of the population, rice is a staple and a major source of food. Clearly, rice is a major source of employment and income.

Rice being such an important crop, it has taken on a political aspect because, when rice prices fall farmers' incomes fall. When rice production declines, consumers have to pay higher prices and a greater proportion of their incomes are needed to purchase rice. Thus, self-sufficiency in rice has become the overriding and continuing goal of the Philippine Government since the late 1950's. Self-sufficiency, however, in the truest sense of the word, was not achieved until relatively lately, that is, during the 1975-76 cropyear under what is known as the Masagana 99 program.

The various rice production programs formulated and implemented since 1950 aimed at achieving self-sufficiency in the shortest possible time. However, while rice production showed an increasing trend over time, we were unable to reach levels that would have enabled the country to forego the need for importing rice to fill the gap between supply and demand. Prior to 1976, the Philippines imported yearly between 150,000 to as much as 650,000 metric tons, the actual importation depending on (1) the current paddy output, (2) the carry-over stocks from previous years, (3) the damages wrought by the numerous typhoons that hit the country yearly, as well as (4) losses from droughts, pests and diseases.

B. The Masagana 99 Program: Its Beginnings, Components and Mechanism

The initiation of the Masagana 99 as a national program was born out of a critical need. The time was in late 1972, when the Philippines was shaken by a series of occurrences which threatened the survival of its people. Yet reeling from the effects of 28 typhoons which hit the country over a four-month period in cropyear 1971; and from a severe outbreak of "tungro" — a rice virus — in cropyear 1972; there occurred, in cropyear 1973, a killer flood which enundated most of the rice plains in the island of Luzon. Aggravating the worsened situation, a severe drought followed, affecting the whole country so that supply conditions became critical and an unusually large amount of rice had to be imported at high prices because the world market was likewise experiencing shortfalls in supply. As a stop-gap measure,

the government urged the rice-eating population to mix milled corn with their rice. (Fortunately for the country, there was a bumper crop of corn at the time, and the Filipino people, in their characteristic resiliency, adapted to the rice-corn mixture quite well.)

Clearly, the government had to act fast to remedy the situation. The answer was the Masagana 99 Program launched by the President in May 1973.[1/] He declared the Masagana 99 Program a national priority and "a program of national survival."

The program involved a delivery system involving high yielding varieties, credit, fertilizer, and other modern inputs. An extension service composed of several thousand rice production technicians was assigned to acquaint the farmer-participants in the program with a new package of technology under a supervised scheme of farming. This involved daily sessions with the farmers and a closely supervised 16-step program to be religiously followed by the participants — step by step.

A credit scheme was instituted whereby farmers could avail of loans at low interest rates without any collateral. The sources of credit were more than 400 rural banks, more than 100 branches of the Philippine National Bank and some 25 field offices of the Agricultural Credit Administration. The Philippine National Bank went directly to the farmers, lending them money, after on-the-spot processing of their application papers. The PNB utilized jeeps, motorcycles, boats and even helicopters in the delivery system.

A palay price support program was also instituted through the National Grains Authority, guaranteeing the farmers a floor price for their paddy, thereby assuring them of stabilized prices and a reasonable profit from farming.

Moreover, a fertilizer subsidy was also implemented as a tool to reduce the impact of the high rice and fertilizer prices that occurred in 1974. A two-tiered price system was instituted, that is, a subsidized fertilizer price for rice and an import-parity price for export crops such as sugar.

During cropyear 1975-76 the Philippines finally attained self-sufficiency in rice production. The country was able to establish a 90-day buffer stock for food security purposes. In 1977-78 the country produced a surplus which enabled it to export 89,000 metric tons to some of its neighbors in Asia.

1/ The word "Masagana" means bountiful and 99 was the targetted yield per hectare, equivalent to about five metric tons of paddy.

For 1978-79 it is projected that the country will produce another bumper crop and enable it to maintain sufficiency and a sizeable buffer stock for emergency purposes to such an extent that it may continue to be in an export position (barring unforeseen abnormal occurrences).

II. THE MASAGANA 99 PROGRAM AND SMALL FARMER PRODUCTION AND INCOME IN ILOILO AND THE PHILIPPINES

This analysis of the Masagana 99 impact on the production and income of small farmers focuses on Iloilo province, for the past eight years ranking first or second among the 74 provinces in the Philippines in terms of palay production. Records of farm operations of small farmer participants were kept and monitored through a BAEcon 10-province project on farm record-keeping.

As a backgrounder, the Bureau of Agricultural Economics in 1971, utilized 120 farmers in the province of Nueva Ecija in Central Luzon to keep daily records of their farm operations for one whole year. This was a successful venture. The Bureau expanded the project to nine other provinces in 1975-76. One of these provinces is Iloilo. As stated above, Iloilo ranked either number one or number two in terms of production among the 74 provinces in the country for the last 8 years. So, when the sponsor of the project requested that we study more closely one province in terms of the impact of the M-99 program on incomes and productivity, Iloilo was chosen. Of the total of 434 respondents from the 10 provinces we selected 135 from Iloilo, or 31 percent.

However, the data used for this paper are of two categories: (1) national production and hectarage figures from 1960 to 1977 (and 1978 in some cases); and (2) complete 1975-76 farm records of 109 Masagana 99 participants and 23 non-participants, or a total of 132 Iloilo farmers.

A. Trend Analysis of National Data

Table 4 shows the results of the trend analysis for production, area and yields of rice as found in the paper of Alix, Kunkel, and Gonzales [4]. To quote "... In addition to the usual time variable, a dummy variable was included to test whether 1970/71 and 1971/72 figures were off trend. This was found to be significant for area and yield and consistent in both direction and magnitudes. Weather records and damage reports were also analyzed and weighted using 1972/73 as an index of

100%. Three levels of severity were included for typhoons, drought and pests: none = 0, moderate = 50% and severe = 100%. The final variable included was to indicate the beginning of the introduction of high yielding varieties. These were then used as explanatory variables in an exponential trend ordinary least squares regression.

Looking at rice production trend by area, yield over crop type, the analysis showed that increases in yields over the past 17 years were responsible for almost all of the increases in production. Furthermore, this production came mostly from increased irrigated areas and the high yielding varieties associated with these areas. The increase in irrigated area was offset by a decline in upland area. Yields have increased dramatically on second crop irrigated lowland, which is the focal target of the Masagana 99 program, from less than two metric tons per hectare to 2.6, or by 32% in seven years."

B. Linear Regression Analysis of Iloilo Data

The Iloilo data was subjected to computerization and regression runs were made to derive production functions which could tell us the relationships among the variables as they affect either production or yields. The production functions as estimated are shown in Table 9, while the means and standard deviations of the various regression variables are found in Table 10.

In order to quantify qualitative variables, we supplied dummy variables for the following: for participants and non-participants, for the wet and dry seasons, and for irrigated and non-irrigated farms. As shown by the means of these dummy variables, 84 percent of the respondents are Masagana 99 participants, 56 percent of the paddy are planted in the second or dry season, and 62 percent of the farms are irrigated.

In the first linear production function where *total paddy production is the dependent variable*, as shown in Table 11, all the regression coefficients have the correct signs, as indicated by the following beta coefficients:

Variable	β
Labor (man-days)	.301
Fertilizer (nitrogen in kgs.)	.398
Chemical (in pesos)	.217
Masagana 99	.013
Crop season	.157
Irrigation	.211

As shown above, fertilizer tends to be the most significant factor affecting palay (paddy) production.

The palay output elasticity with respect to fertilizer at the means, is 0.393. This parameter tends to be consistent with previous studies. For example, Rodriguez [10] in his fertilizer study found the output elasticity to be 0.3. The difference between the mean paddy production (which actually is the M-99 regression coefficient) of the Masagana 99 participants and non-participants is 109 kg. This differential appears to be statistically insignificant.

On the other hand, the second estimated production function using *palay yield per hectare* as the dependent variable is given in Table 12. Except for the labor coefficient, all the regression parameters have the correct signs. This is, of course, to be expected since labor under the usual farming system is not as intensively utilized and therefore should not show a significant influence on yields. The significant drop in the coefficient of determination (R^2) upon comparison with that previously obtained in the first production function, can be attributed to the absence of stochastic variables in our yield functions. The omission of the former is dictated more by data constraints. Nevertheless, the magnitude of R^2 in the yield functions is close to that obtained by Atkinson and Kunkel [5], Cañete [6], and David [7].

However, unlike the earlier finding, the Masagana 99 variable (whose $\hat{t} = 3.78$ (linear function) and $\hat{t} = 2.39$ (ln) is statistically significant in the yield function. This is clearly shown by the minimum yield difference between the participants and non-participants, which is 1,364 kgs. The incremental yield advantage of the Masagana 99 participant over the non-participant implied by the logarithmic form is 33 percent. The yield elasticity with respect to fertilizer ranges from 0.10 to 0.15, e.g., a 20 percent rise in the use of nitrogen results in a three percent increase in yields.

Also, from the individual farm-firm's profit function defined as:

$$(1) \quad \pi = P \mathcal{L} \prod_{i=1}^{3} X_i^{b_i} e^{\sum_{i=1}^{3} b_i D_i} - \sum_{i=1}^{3} W_i X_i$$

where X refers to the ith farm input
W_i is the ith input price
D_i is the irrigation, season, or Masagana 99
P_i is the exogenously fixed product price dummy

and:

$$(2) \quad \frac{\partial \pi}{\partial X_i} = b_i \frac{Y}{X_i} = W_i \quad , \quad i = 1 \ldots 3$$

$$\text{where } Y = \mathcal{L} \prod_{i=1}^{3} X_i^{b_i} e^{\sum_{i=1}^{3} b_i D_i}$$

we can obtain the fertilizer demand, 2/ i.e.:

2/ Attempts were made to estimate various farm input demands from partial profit functions by invoking Shepherd's lemma. Unfortunately, the signs of the input variables in the estimated profit functions were not correct (not negative).

$$(3)\ Q_F = W_1^{\left[\frac{1 - b_2 - b_3}{(b_1 + b_2 + b_3) - 1}\right]} W_2^{\left[\frac{b_2}{(b_1 + b_2 + b_3) - 1}\right]} W_3^{\left[\frac{b_3}{(b_1 + b_2 + b_3) - 1}\right]}$$

$$e^{-\left[\frac{1}{(b_1 + b_2 + b\ ) - 1}\right] U} \left[\mathcal{L}_P\right]^{-\left[\frac{1}{(b_1 + b_2 + b_3) - 1}\right]} \lambda$$

where $U = \sum_{i=1}^{3} b_i D_i$

$$\lambda = b_1^{\left[\frac{b_2 + b_1 + b_3) - 1}{1 - (b_1 + b_2 + b_3)}\right]} b_2^{\left[\frac{-b_2}{1 - (b_1 + b_2 + b_3)}\right]} b_3^{\left[\frac{-b_3}{1 - (b_1 + b_2 + b_3)}\right]}$$

An estimate of equation (3) derived from the logarithmic palay yield function is

$$(3')\ \hat{Q}_F = .782\ W_1^{-1.11}\ W_2^{.119}\ W_3^{-086}\ e^{1.08U}\left[1165P\right]^{1.08}$$

where W_1 = price of fertilizer
W_2 = wage rate
W_3 = price per unit of chemicals

The implied price elasticity from equation 3' is -1.11. This is quite high since empirical estimates made by Rodriguez [10] is about -.6. This can be partially explained by the fact that the estimates of the latter were based on aggregates while the present estimates are derived from micro level data. Moreover, this paper has utilized cross sectional data while the Rodriguez paper utilized time series data.

Tabular Comparative Analysis

In the accompanying tables are shown the comparative information on costs and returns of the different farmers by type of participation in the Masagana 99 program, by season, and for irrigated and non-irrigated farms in Iloilo province for cropyear 1976. Statistical data are also provided to show the trend of production and yields of paddy on a national scale as a means to reflect the impact of the Masagana 99 program on farmers' production and yields.

1. Impact on production

Tables 6 and 7 show paddy production, harvest area, and yield per hectare by crop type, by semester, for the years 1960-1977. An analysis of these tables shows that the utilization alone of HYVs since 1968 have resulted in an average production increase of 7.6 percent annually but that the use of HYVs since 1973, the year when Masagana 99 was launched, resulted in a 7.9 percent increase in production, followed by 7.2 percent in 1974, 8.3 percent in 1975, 11.5 percent in 1976, 10 percent in 1977.

2. Impact on yield

The impact of the Masagana 99 program on yields of farmers is shown in Table 5, for the dry and the wet seasons, categorized into irrigated and non-irrigated farms.

In the pre-Masagana 99 period, on irrigated farms paddy yields were 2.11 m.t. in 1970 and dropped to 1.82 in 1973 due to the effects of the different calamities. The second semester yields in the pre-Masagana 99 period were relatively constant in irrigated farms, showing that since no typhoons occur during this period of the year and because of irrigation, yields can be maintained.

However, during the Masagana 99 period starting in 1974 up to cropyear 1977-78, one will notice a very clear indication of yield increases over time, from 1.94 m.t. to 2.59 metric tons per hectare or a 33.5 percent increase during the first semester. For the second semester, the change was from 2.13 metric tons to 2.94 or an increase

of 38.0 percent. What is indicated here is that during the latter period, because of the availability of water and the absence of typhoons, the increase in yields shown can probably be attributed solely to the program itself.

For all paddy in the first semester there was a 10 percent increase between the pre-Masagana 99 yields and the Masagana 99 period. On irrigated areas there was a comparative increase of 9.6 percent.

During the second semester (dry season) the results are even more impressive. For all paddy during the second semester there was a 19 percent increase in yield between the pre-Masagana 99 period and the Masagana 99 period. For irrigated farms the change is even more significant, as shown by the 26 percent yield increase.

3. Impact on income

Wet season. During the first semester or wet season, Masagana 99 participants produced four metric tons per hectare while non-participants produced 2.5 metric tons in irrigated areas. In rainfed areas, participants produced 2.8 metric tons per hectare while non-participants got 1.5 metric tons per hectare. Overall, between the participant and the non-participant during the wet season, the participant-farmer produced 3.5 metric tons average for irrigated and non-irrigated farms while the non-participant produced 2.0 metric tons.

In value terms, irrigated farms earned a gross income of close to ₱4,000 per hectare; non-irrigated farms, ₱2,690 or an average of ₱3,380. In profit terms, they earned a gross margin of ₱1,231 under irrigation and ₱769 in non-irrigated farms, or an average of ₱864.60 per hectare.

On the other hand, non-participants earned a gross income of ₱2,360 per hectare in irrigated areas and ₱1,465 in non-irrigated farms, or an average of ₱1,928. In terms of gross margins, these farmers earned a little over ₱1,000 per hectare in irrigated farms and ₱587 per hectare in non-irrigated farms, or an average of ₱781 per hectare. Thus, during the wet season the Masagana 99 participants show a very large advantage in income terms as well, over the non-participants.

Dry season. The same picture can be gleaned from the data in Tables 27, 28, and 29. Irrigated farms of Masagana 99 participants grossed ₱3,160 while the non-participants grossed ₱2,380. In non-irrigated farms, Masagana 99 participants grossed ₱1,870 per hectare while non-participants grossed ₱913 per hectare.

4. Impact on employment

During the wet season, Masagana 99 participants utilized a total of 98.5 man-days of labor in irrigated areas and 70.3 man-days in non-irrigated farms, while non-participants utilized only 45 man-days in irrigated and 47 man-days in non-irrigated areas.

During the dry season, Masagana 99 participants utilized a total of 88.3 man-days in irrigated farms and 85.1 man-days in non-irrigated farms as compared to 83.4 man-days for the non-participants in irrigated areas and 51 man-days in the non-irrigated farms. These figures indicate fuller utilization of labor and consequently higher employment rates by M-99 participants.

III. IMPLICATIONS AND CONCLUSIONS

National Production

1. National data shows a 32% increase in yield over a period of seven years (1970 to 1977). However, from 1973 (when the M-99 Program was launched) to 1978 the Philippines achieved a higher yield increment of 38.5 percent.

2. Trend analysis of national production figures shows that increases in yields accounted for almost all the increases in production.

3. Second semester (dry season) data for all paddy produced in the country during the season clearly indicate that because of the availability of irrigation water and the absence of typhoons

   a. yields during the pre-Masagana 99 period were relatively unchanged; and

   b. a 38.0 percent increase in yields in the M-99 period was brought about utilizing a package of technology.

Iloilo Province

4. Analysis of data gathered on the M-99 Program involving 135 farmers shows that the yield differential per hectare between M-99 participants and non-participants in Iloilo Province is 1.364 kilograms, equivalent to 27.2 sacks of 50 kilos. In peso terms, at the ₱55 support price the value of the yield differential means a larger return of ₱1,496 to the M-99 participants than non-participants.

5. The analysis further shows that fertilizer is the most significant factor which affects paddy production.

6. M-99 participants in Iloilo earned approximately 75 percent more than non-participants during the wet season (first semester) and a little more than 55 percent during the dry season.

7. The M-99 Program as shown by the Iloilo data is labor intensive and employment-generating.

8. The M-99 Program can be directly identified with the attainment and maintenance of self-sufficiency in rice in the Philippines since 1976.

Table 1. Vegetative cover by type, Philippines, 1969

Type	*Area (hectares)*	*Distribution (percentage)*
Forest Area	16,085,260	53.61
Commercial forest	8,852,514	29.50
Non-commercial forest	7,232,746	24.11
Non-Forest Area	13,914,740	46.39
Cultivated and other land	10,393,088	34.66
Open or grass land	3,303,903	11 01
Marshes	217,749	0.72
TOTAL AREA	30,000,000	100.00

Source: Bureau of Forestry, Manila

Table 2. Net domestic product [1] by industrial origin, Philippines, 1973-1974

Industry	*Value in Million Pesos* [2] 1973	1974 [3]	*Percent Distribution* 1973	1974
Agriculture, fishery and forestry	9,306	9,626	30.1	29.7
Services	7,145	7,653	23.1	23.6
Manufacturing	6,527	6,755	21.1	20.8
Commerce	4,972	5,197	16.1	16.0
Transportation, communications, storage and utilities	1,298	1,384	4.2	4.3
Construction	925	1,064	3.0	3.3
Mining and quarrying	730	734	2.4	2.3
Net Domestic Product at factor cost	30,903	32,413	100.0	100.0

1 Net Domestic Product (NDP) is the total of goods and services produced in the country, net of indirect taxes and capital consumption allowance.

2 At constant 1967 prices.

3 Preliminary estimates.

Source: National Economic and Development Authority (1975, p. 25)

Table 3. Employment in agriculture and non-agriculture sectors, Philippines, 1968-1974

(in thousands)

Sector	1968	1969	1971	1972	1973	1974
Agriculture	7,202 (57.7)*	6,325 (56.3)	6,440 (51.2)	7,166 (54.2)	7,016 (52.9)	8,245 (56.9)
Non-agriculture	5,279 (42.3)	4,910 (43.7)	6,144 (48.8)	6,051 (45.3)	6,246 (47.1)	6,234 (43.1)
TOTAL	12,481 (100.0)	11,235 (100.0)	12,584 (100.0)	13,217 (100.0)	13,262 (100.0)	14,479 (100.0)

* Figures in parentheses are percentages of total.

Source: Bureau of the Census and Statistics

Table 4. PADDY: Harvest area, yield and production, Philippines, 1960-1978

YEAR	HARVEST AREA		YIELD PER HECTARE		PRODUCTION	
	Actual '000 has.	Index of Change 1973 = 100	Actual m.t.	Index of Change 1973 = 100	Actual '000 m.t.	Index of Change 1973 = 100
1960	3306.5	106.3	1.131	79.7	3739.5	84.7
1965	3199.7	102.8	1.248	87.9	3992.5	90.4
1970	3527.0	113.3	1.485	104.7	5233.4	118.5
1971	3527.0	113.3	1.515	106.8	5342.9	121.0
1972	3246.4	104.3	1.571	110.7	5100.1	115.5
1973	3111.8	100.0	1.419	100.0	4414.6	100.0
1974	3436.8	110.4	1.628	114.7	5594.1	126.7
1975	3538.8	113.7	1.539	108.5	5666.0	128.3
1976	3579.3	115.0	1.721	121.3	6159.5	139.5
1977	3547.5	114.0	1.820	128.3	6456.1	146.2
1978	3508.9	112.8	1.965	138.5	6894.9	156.2

Source: Bureau of Agricultural Economics, Quezon City

Table 5. Yield per hectare, by semester, all palay farms and irrigated palay farms, Philippines, CY 1969-1978

(in metric tons)

ITEM	FIRST SEMESTER		SECOND SEMESTER	
	All Palay	Irrigated	All Palay	Irrigated
Pre-Masagana Period				
1969	1.32	—	1.36	—
1970	1.70	2.11	1.64	1.97
1971	1.71	2.04	1.74	1.93
1972	1.52	1.94	1.68	1.99
1973	1.39	1.82	1.50	1.99
Masagana 99 Period				
1974	1.60	1.94	1.69	2.13
1975	1.48	1.97	1.83	2.39
1976	1.68	2.18	1.81	2.35
1977	1.74	2.16	1.97	2.61
1978	1.90	2.59	2.10	2.94
Average Yield (5 years)	1.53	1.98	1.58	1.97
Pre-Masagana 99 Period	1.68	2.17	1.97	2.49
Masagana 99 Period	(10% inc.)	(9.6% inc.)	(19% inc.)	(26% inc.)

Table 6. PADDY: Production, harvest area and yield per hectare, by crop type, CY 1960-1977

CROP YEAR	IRRIGATED LOWLAND			NON-IRRIGATED LOWLAND			UPLAND		
	Production '000 m.t.	Harvest Area '000 has.	Yield m.t.	Production '000 m.t.	Harvest Area '000 has.	Yield m.t.	Production '000 m.t.	Harvest Area '000 has.	Yield m.t.
1960	1468	1016	1.44	1645	1500	1.10	627	790	.79
1961	1450	960	1.51	1840	1660	1.11	415	578	.72
1962	1529	987	1.52	1877	1510	1.24	524	682	.77
1963	1589	1014	1.56	1812	1451	1.25	566	697	.82
1964	1526	930	1.64	1824	1530	1.19	494	627	.79
1965	1578	958	1.64	1915	1607	1.19	500	634	.79
1966	1734	960	1.80	1901	1543	1.23	437	606	.72
1967	1864	1171	1.60	1858	1480	1.26	372	445	.84
1968	2271	1309	1.74	1894	1514	1.25	397	481	.83
1969	2545	1483	1.72	1549	1407	1.10	351	443	.79
1970	2761	1346	2.05	2049	1356	1.52	423	412	1.03
		(1408)a	(1.96)a		(1616)b	(1.27)b		(485)c	(.87)c
1971	2931	1471	2.00	2038	1277	1.60	374	365	1.02
		(1532)a	(1.91)a		(1527)b	(1.35)b		(433)c	(.86)c
1972	2617	1332	1.96	2170	1548	1.40	313	366	.86
1973	2344	1241	1.89	1729	1436	1.20	342	434	.79
1974	2015	1494	2.02	2195	1534	1.43	384	409	.94
1975	3034	1412	2.14	2241	1674	1.34	385	453	.85
1976	3370	1495	2.26	2450	1695	1.44	340	390	.87
1977	3494	1490	2.35	2536	1657	1.53	427	401	1.06

a Projected trend on area and yield of irrigated lowland.
b Projected trend on area and yield of non-irrigated lowland.
c Projected trend on area and yield of upland.

Source: Bureau of Agricultural Economics, Quezon City

Table 7. PADDY: Production, harvest area and yield by crop type, by semester, Philippines, CY 1970-1977

CROP YEAR	SEMESTER	IRRIGATED LOWLAND			NON-IRRIGATED LOWLAND			UPLAND		
		Production '000m.t.	Harvest Area '000has.	Yield m.t.	Production '000m.t.	Harvest Area '000has.	Yield m.t.	Production '000m.t.	Harvest Area '000has.	Yield m.t.
1970	I	1667	791	2.11	1589	979	1.62	396	380	1.04
	II	1094	555	1.97	460	377	1.22	27	32	84
1971	I	1716	840	2.04	1446	876	1.65	355	346	1.02
	II	1215	630	1.92	592	402	1.48	19	19	1.03
1972	I	1449	745	1.94	1482	1038	1.42	277	329	.84
	II	1169	587	1.99	688	510	1.35	36	37	.97
1973	I	1333	734	1.82	1371	1057	1.30	302	377	.80
	II	1011	507	1.99	359	379	.94	40	57	.70
1974	I	1758	904	1.94	1639	1073	1.52	353	369	.96
	II	1257	590	2.13	556	460	1.20	31	40	.78
1975	I	1597	812	1.96	1535	1139	1.34	338	393	.86
	II	1437	600	2.40	705	535	1.32	47	60	.79
1976	I	1864	854	2.18	1764	1152	1.53	295	336	.88
	II	1506	640	2.35	686	543	1.26	45	54	.84
1977	I	1886	876	2.16	1778	1114	1.60	365	333	1.10
	II	1607	616	2.61	758	544	1.40	62	68	.91

Source: Bureau of Agricultural Economics, Quezon City

Table 8. Increase in paddy production attributable to HYV's, Philippines, 1968-1977

Year	Crop Type	HYV Area (1000 has.)	Increment in HYV yields over OV yields (kg./ha.)	Production gained from HYV's (1000 m.t.)	Total palay production (1000 m.t.)	Production gained through use of HYV's (percent)
1968	Irrigated	45.1	366	162.9		
	Rainfed	256.4	53	13.6		
1969	Irrigated	701.5	252	176.5	4563	3.9
	Rainfed	912.8	159	145.1		
1970	Irrigated	438.9	35	15.4		
	Rainfed	1351.7	119	160.5	4444	3.6
1971	Irrigated	826.6	268	221.5		
	Rainfed	527.4	-40	-21.2		
1972	Irrigated	1354.0	148	200.4	5232	3.8
	Rainfed	985.0	92	90.6		
1973	Irrigated	580.4	35	20.3		
	Rainfed	1565.4	71	110.9	5342	2.1
1974	Irrigated	977.1	330	322.4		
	Rainfed	849.7	92	78.2		
1975	Irrigated	1826.8	219	400.6	5100	7.9
	Rainfed	872.8	209	182.4		
1976	Irrigated	807.1	166	134.0		
	Rainfed	1679.9	188	316.4	4414	7.2
1977	Irrigated	1194.5	162	193.5		
	Rainfed	982.1	277	272.0		
	Irrigated	2176.6	214	465.5	5594	8.3
	Rainfed	1108.9	343	380.3		
	Irrigated	1066.1	251	267.6		
	Rainfed	2175.0	298	647.9	5660	11.5
	Irrigated	1207.3	321	387.5		
	Rainfed	1092.4	210	229.4		
	Irrigated	2299.7	268	616.9	6159	10.0
	Rainfed	1285.5	395	507.8		
	Irrigated	1131.2	280	429.8		
	Rainfed	2416.7	388	937.6	6456	14.6
			216.5	403.3		7.6

Source: Bureau of Agricultural Economics, Quezon City

Table 9. Regression results for production, area and yield of rice* 1

Item	R 2	Trend	Dummy	Typhoon	Drought	Pest	HYV
			In percent				
Production							
Total	93.7	2.0	1.4*	- 8.1	-13.6	- 1.9*	14.6
Irrigated	96.7	3.4	7.6*	- 4.3*	- 7.5*	- 2.4*	31.1
Rainfed	84.1	1.7	- 3.8*	-11.2	-20.6	1.6*	0.7*
Upland	74.7	-2.6	- 8.9*	-12.6*	-18.8	-24.0	6.9*
Area							
Total	59.8	.002*	-11.3	- 5.6	- 6.7	- 5.4*	10.5
Irrigated	83.4	.83*	3.3*	2.3*	0.5*	- 0.9*	28.4
Rainfed	72.9	.51*	-19.8	-11.4	-11.7	-11.9	3.1*
Upland	86.4	-2.92	-22.8	-11.3	-11.0*	-22.3	-1.0*
Yield							
Total	97.7	1.88	13.32	- 2.96*	- 8.10	2.99	5.79
Irrigated	95.4	2.56	4.6*	- 6.6	- 7.8	1.3*	1.9*
Rainfed	90.8	1.20	9.91	- .05*	-10.16	6.61*	-2.13*
Upland	84.1	.31*	18.2	- 1.1*	- 8.6	- 2.0*	7.6*

* Not significant

1 The trend equation was of the form $Y = Y_o e^{rt} di + TY + PST + HYV$

where Y_o is a constant, r is the growth rate, t is time = 60 . . . 77

d = for 1970 or zero otherwise:

Drt = (1 for serious drought; (.5 for moderate drought; (0 for no drought

PST = (1 for serious pest outbreak; (.5 for moderate pest outbreak; (0 for no pest outbreak

TY = (1 for serious typhoon; (.5 for moderate typhoon; (0 for no typhoon

HYV = (0 for 1960-1967; (1 for 1967-1976

Table 10. PURE LOWLAND PALAY: Mean and standard deviation, Iloilo Province, 1976

Item	Mean	Standard Deviation
M-99 1 — Masagana 99 Participants 0 — Non-Masagana	0.843220	0.364365
Season 1 — Wet 0 — Dry	0.563559	0.496997
Irrigation 0 — Non-Irrigated 1 — Irrigated	0.618644	0.486752
Yield (kilograms)	3732.2153	3068.5545
Production (value)	3577.9512	2947.3469
Labor (man-days)	97.3618	50.8103
Labor (value)	1149.8456	817.9504
Fertilizer (nitrogen in kilograms)	54.6521	45.4626
Fertilizer (value)	249.5111	199.5985
Chemicals (value)	80.3759	74.3507

No. of observations = 236

Table 11. PURE LOWLAND PALAY: Regression coefficient, standard error, T-value and other statistics, Iloilo Province, 1976

(Dependent Variable: Production)

Item	Regression Coefficient	Standard Error	T-Value
Independent Variables:			
M-99 1 — Masagana 99 Participants 0 — Non-Masagana	108.794088	403.772048	0.269444
Season 1 — Wet 0 — Dry	973.988353	286.814145	3.395887**
Irrigation 1 — Irrigated 0 — Non-Irrigated	133.303919	321.582446	0.414525
Labor (man-days)	18.203183	3.054679	5.959115**
Fertilizer (nitrogen in kilograms)	26.882234	3.914958	6.866545**
Chemical (value)	8.984650	2.120836	4.236372**
Dependent Variable:			
Total Production (kilograms)			
Constant Term	-952.64560		
R 2	0.520181		
R 2 Corrected for Degrees of Freedom	0.509750		

** Significant at 1% probability level

No. of observations = 236

Table 12. PURE LOWLAND PALAY: Regression coefficient, standard error, T-value and other statistics, Iloilo Province, 1976

(Dependent Variable: Yield per Hectare)

Item	Regression Coefficient	Standard Error	T-Value
M 99 1 — Masagana 99 Participants 0 — Non-Masagana	1364.367198	360.759685	3.781928**
Season 1 — Wet 0 — Dry	967.855891	256.230911	3.777280**
Irrigation 1 — Irrigated 0 — Non Irrigated	968.947345	287.147296	3.374391**
Labor (man-days)	-7.112228	2.730799	2.604449**
Fertilizer (nitrogen in kilograms)	9.179628	3.504277	2.619625**
Chemicals (value)	2.315871	1.894975	1.222112
Dependent Variable: Production (per hectare)			
Constant Term	1031.0362		
R 2	0.2507645		
R 2 Corrected for Degrees of Freedom	0.2344768		

** Significant at 1% probability level

No. of observations = 236

Table 13. LOWLAND RICE, WET SEASON: Harvest area and distribution of farms by varietal classification, irrigation and tenurial status, 111 farms, Iloilo Province, 1976

HARVEST AREA AND TENURIAL STATUS	MASAGANA-99 PARTICIPANTS							
	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.19		1.31		—		1.17	
Tenurial status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
a. Owner operator	3	5	2	5	—	—	1	33
b. Part-owner	4	6	3	7	—	—	—	—
c. Amortizing owner	—	—	—	—	—	—	—	—
d. Leaseholder	30	45	22	52	—	—	—	—
e. Tenant	21	32	10	24	—	—	2	67
f. Others	8	12	5	12	—	—	—	—
ALL TENURIAL STATUSES*	66	100	42	100	—	—	3	100

* Includes partially irrigated farms

Table 14. LOWLAND RICE, WET SEASON: Harvest area and distribution of farms by varietal classification, irrigation and tenurial status, 23 farms, Iloilo Province, 1976

(NON MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND TENURIAL STATUS	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.84		.87		—		1.05	
Tenurial status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
a. Owner operator	4	50	2	17	—	—	1	34
b. Part-owner	2	25	—	—	—	—	1	33
c. Amortizing owner	—	—	—	—	—	—	—	--
d. Leaseholder	2	25	4	33	—	—	—	—
e. Tenant	—	—	6	50	—	—	1	33
f. Others	—	—	—	—	—	—	—	—
ALL TENURIAL STATUSES	8	100	12	100	—	—	3	100

Table 15. LOWLAND RICE, WET SEASON: Harvest area and distribution of farms by varietal classification, irrigation and size group, 111 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND SIZE GROUP	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.19		1.38		—		1.17	
Size Group	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0.10 — 0.50 ha.	14	21	3	7	—	—	—	—
0.51 — 1.00	26	39	17	40	—	—	2	67
1.01 — 1.50	16	24	13	31	—	—	1	33
1.51 — 2.00	4	6	3	7	—	—	—	—
2.01 — 2.50	3	5	3	7	—	—	—	—
2.51 — 3.00	—	—	2	5	—	—	—	—
3.01 — 3.50	1	2	—	—	—	—	—	—
3.51 — 4.00	—	—	1	3	—	—	—	—
4.01 — 4.50	2	3	—	—	—	—	—	—
ALL SIZE GROUPS*	66	100	42	100	—	—	3	100

* Includes partially irrigated farms

Table 16. LOWLAND RICE, WET SEASON: Harvest area and distribution of farms by varietal classification, irrigation and size group, 23 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND SIZE GROUP	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.84		0.87		—		1.05	
Size group	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0.10 — 0.50 ha.	1	13	6	50	—	—	—	—
0.51 — 1.00	2	25	3	25	—	—	2	67
1.01 — 1.50	1	13	2	17	—	—	1	33
1.51 — 2.00	2	25	1	8	—	—	—	—
2.01 — 2.50	1	12	—	—	—	—	—	—
2.51 — 3.00	—	—	—	—	—	—	—	—
3.01 — 3.50	—	—	—	—	—	—	—	—
3.51 — 4.00	—	—	—	—	—	—	—	—
4.01 — 4.50	—	—	—	—	—	—	—	—
4.51 — 5.00	1	12	—	—	—	—	—	—
ALL SIZE GROUPS	8	100	12	100	—	—	3	100

Table 17. LOWLAND RICE, DRY SEASON: Harvest area and distribution of farms by varietal classification, irrigation and size group, 89 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND SIZE GROUP	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Acerage harvest area (Hectares)	1.14		1.23		—		1.12	
Size Group	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0.10 —0.50 ha.	13	20	2	9	—	—	—	—
0.51 — 1.00	24	37	11	51	—	—		
1.01 — 1.50	18	28	5	23			1	50
1.51 — 2.00	5	8	2	9	—	—	1	50
2.01 — 2.50	2	3	1	4	—	—	—	—
2.51 — 3.00	1	1	1	4	—	—	—	—
3.01 — 3.50	—	—	—	—	—	—	—	—
3.51 — 4.00	—	—	—	—	—	—	—	—
4.01 — 4.50	2	3	—	—	—	—	—	—
4.51 — 5.00	—	—	—	—	—	—	—	—
ALL SIZE GROUPS	65	100	22	100	—	—	2	100

Note: Only 89 out of the 109 Masagana 99 participants planted during the dry season.

Table 18. LOWLAND RICE, DRY SEASON: Harvest area and distribution of farms by varietal classification, irrigation and tenurial status, 14 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND SIZE GROUP	FARMS REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.49		0.98		—		1.00	
Tenurial status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
a. Owner operator	4	57	2	33	—	—	—	—
b. Part-owner	2	29	—	—	—	—	1	100
c. Amortizing owner	—	—	—	—	—	—	—	—
d. Leaseholder	1	14	1	17	—	—	—	—
e. Tenant	—	—	3	50	—	—	—	—
f. Others	—	--	—	—	—	—	—	—
ALL TENURIAL STATUSES	7	100	6	100	—	—	1	100

Note: Only 89 out of the 109 Masagana 99 participants planted during the dry season.

Table 19. LOWLAND RICE, DRY SEASON: Harvest area and distribution of farms by varietal classification, irrigation and tenurial status. 89 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND TENURIAL STATUS	FARM REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.19		1.23		—		1.12	
Tenurial status	Number	Percent	Number	Percent	Number	Percent	Number	Percent
a. Owner operator	3	5	—	—	—	—	—	—
b. Part-owner	4	6	2	9	—	—	—	—
c. Amortizing owner	—	—	—	—	—	—	—	—
d. Leaseholder	30	46	12	54	—	—	—	—
e. Tenant	19	29	5	23	—	—	2	100
f. Others	9	14	3	14	—	—	—	—
ALL TENURIAL STATUSES	65	100	22	100	—	—	2	100

Note: Only 89 out of the 109 Masagana 99 participants planted during the dry season.

Table 20. LOWLAND RICE DRY SEASON: Harvest area and distribution of farms by varietal classification, irrigation and size group, 14 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

HARVEST AREA AND SIZE GROUP	FARM REPORTING							
	HIGH YIELDING VARIETIES				TRADITIONAL VARIETIES			
	Irrigated		Non-Irrigated		Irrigated		Non-Irrigated	
Average harvest area (Hectares)	1.49		0.98		—		1.00	
Size group	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0.10 — 0.50 ha.	1	14	2	33	—	—	—	—
0.51 — 1.00	2	29	2	33	—	—	1	100
1.01 — 1.50	1	14	1	17	—	—	—	—
1.51 — 2.00	1	14	1	17	—	—	—	—
2.01 — 2.50	2	29	—	—	—	—	—	—
2.51 — 3.00	—	—	—	—	—	—	—	—
3.01 — 3.50	—	—	—	—	—	—	—	—
3.51 — 4.00	—	—	—	—	—	—	—	—
4.01 — 4.50	—	—	—	—	—	—	—	—
4.51 — 5.00	—	—	—	—	—	—	—	—
ALL SIZE GROUPS	7	100	6	100	—	—	1	100

Note: Only 14 out of the 23 non-Masagana 99 participants planted in the dry season.

Table 21. NON-MASAGANA 99 PARTICIPANTS: Fertilizer application in kilogram per hectare by season and irrigation type in selected farms, Iloilo Province, 1976

PLANT NUTRIENT	FERTILIZER APPLICATION (in kilogram per hectare)					
	DRY SEASON			WET SEASON		
	Irrigated	Non-Irrigated	All Palay	Irrigated	Non-Irrigated	All Palay
Nitrogen	43.27	14.10	32.18	36.63	6.20	22.09
Phosphorus	9.04	1.02	5.84	10.48	1.47	6.14
Potassium	1.35	1.02	1.22	1.00	0	1.00
TOTAL	53.63	16.14	39 24	48.11	7.67	29.23

Table 22. MASAGANA 99 PARTICIPANTS: Fertilizer application in kilogram per hectare by season and irrigation type in selected farms, Iloilo Province, 1976

PLANT NUTRIENT	FERTILIZER APPLICATION (in kilogram per hectare)					
	DRY SEASON			WET SEASON		
	Irrigated	Non-Irrigated	All Palay	Irrigated	Non-Irrigated	All Palay
Nitrogen	56.52	26.91	48.13	59.33	32.76	47.63
Phosphorus	9.76	4.97	8.40	9.93	6.27	8.32
Potassium	1.41	1.22	1.36	.79	1.89	1.29
TOTAL	67.69	33.10	57.89	70.05	40.92	57.22

Table 23. PURE LOWLAND PALAY, WET SEASON: Labor utilization per hectare by farming operation, 111 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

FARM OPERATION	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Man-days	Value in pesos	Man-days	Value in pesos	Man-days	Value in pesos
Seedbed preparation	1.74	10.32	1.74	11.64	1.74	10.90
Plowing	12.20	154.47	16.74	96.96	14.20	129.15
Harrowing	11.27	50.50	10.19	45.07	10.80	48.11
Diking	1.07	7.33	.34	1.86	.75	4.92
Pulling, bundling of seedling	3.98	24.58	3.56	25.54	3.80	25.00
Transplanting	12.39	91.16	9.34	64.45	11.05	79.40
Irrigation	1.16	6.35	—	—	1.16	6.35
Weeding	10.84	56.15	5.76	28.11	8.61	43.80
Fertilizing	1.68	10.14	1.38	9.50	1.68	9.86
Chemical application	3.21	18.68	2.08	13.47	2.71	16.38
Harvesting/threshing-hauling	26.78	767.83	17.27	493.95	22.59	647.24
Drying	2.27	17.78	1.19	3.71	1.79	15.34
Other crop work	.91	5.73	.43	3.71	.70	4.84
TOTAL	89.50	1221.02	70.32	806.50	81.58	1041.29

Table 24. PURE LOWLAND PALAY, DRY SEASON: Labor utilization per hectare by farming operation, 89 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

FARM OPERATION	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Man-days	Value in pesos	Man-days	Value in pesos	Man-days	Value in pesos
Seedbed preparation	1.70	9.16	2.79	13.67	2.01	10.44
Plowing	11.25	169.67	22.24	82.96	14.37	145.09
Harrowing	12.30	51.23	14.33	44.05	12.87	49.20
Diking	1.13	6.28	.62	2.05	.98	5.08
Pulling, bundling of seedling	3.52	27.84	3.56	20.40	3.53	25.74
Transplanting	14.84	82.43	8.21	57.81	12.96	75.45
Irrigation	.95	19.47	—	—	.95	19.47
Fertilizing	1.65	12.18	1.67	8.46	1.66	11.12
Weeding	9.63	61.70	7.95	33.47	9.16	53.70
Chemical application	3.38	11.72	1.95	9.94	2.97	11.22
Harvesting/threshing -hauling	24.72	581.33	20.43	345.21	23.51	514.38
Drying	2.08	17.14	.91	9.34	1.75	14.65
Other crop work	1.13	8.85	.46	2.14	.94	6.95
TOTAL	88.28	1039.53	85.12	628.50	87.66	942.49

Table 25. PURE LOWLAND PALAY, WET SEASON: Labor utilization per hectare by farming operation, 23 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

FARM OPERATION	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Man-days	Value in pesos	Man-days	Value in pesos	Man-days	Value in pesos
Seedbed preparation	1.14	7.49	1.09	8.76	1.12	8.10
Plowing	5.10	189.86	9.92	59.56	7.42	127.20
Harrowing	5.11	32.85	6.99	39.94	6.01	36.26
Diking	.80	5.12	.29	1.95	.55	3.60
Pulling, bundling of seedlings	2.85	27.43	3.72	24.40	3.27	25.97
Transplanting	6.60	88.39	5.08	42.31	5.87	66.23
Irrigation and drainage	.59	4.16	—	—	.59	4.16
Weeding	2.01	30.15	5.02	25.28	3.46	26.84
Fertilizing	1.11	3.94	.14	1.29	.72	2.67
Chemical application	.87	8.05	.76	5.30	.82	6.73
Harvesting/threshing-hauling	17.71	471.33	13.48	190.46	15.68	336.24
Drying	.99	37.03	.33	1.62	.67	20.00
Other farm work	.17	2.72	.46	3.52	.31	3.11
TOTAL	45.05	908.52	47.28	402.39	46.49	667.11

Table 26. PURE LOWLAND PALAY, DRY SEASON: Labor utilization per hectare by farming operation, 14 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

FARM OPERATION	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Man-days	Value in pesos	Man-days	Value in pesos	Man-days	in pesos Value
Seedbeed preparation	1.88	15.45	.70	2.21	1.41	10.18
Plowing	13.47	220.17	16.63	65.61	14.72	158.63
Harrowing	10.48	50.21	8.94	34.64	9.87	44.01
Diking	1.57	8.78	—	—	.94	5.28
Pulling, bundling of seedlings	4.42	36.83	3.01	25.66	3.86	32.38
Transplanting	11.85	46.10	3.02	16.26	8.33	34.22
Irrigation	.65	3.04	—	—	.65	3.04
Weeding	3.24	26.11	2.97	15.04	3.15	1.83
Fertilizing	1.66	22.91	.33	1.40	1.13	21.70
Chemical preparation	2.02	19.92	.69	2.57	1.49	14.35
Harvesting/threshing-hauling	30.89	570.00	14.27	147.81	24.27	401.91
Drying	.89	34.63	.44	1.92	.71	21.60
Other farm work	.38	4.81	—	—	.38	4.81
TOTAL	83.40	1058.96	51.00	313.12	70.89	753.94

Table 27. PURE LOWLAND PALAY, WET SEASON: Costs and returns by irrigation type, 111 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
FARMS REPORTING (No.)	66		45		111	
AVERAGE HARVEST AREA (Ha.)	1.19		1.37		1.26	
TOTAL PRODUCTION (Kgm.)	4826.30	4065.03	3889.08	2838.74	4446.34	3525.06
GROSS INCOME (₱)	4657.21	3922.61	3691.81	2694.75	4265.83	3381.95
VARIABLE COSTS	(in pesos)					
CASH	914.87	770.57	828.56	604.77	765.85	854.83
Fertilizer expense	284.17	239.35	196.42	143.37	248.60	197.09
Seed expense	—	—	—	—	—	—
Chemical expense	87.40	73.62	58.19	42.48	75.56	59.90
Hired labor expense	539.74	454.60	569.76	415.86	437.88	594.82
Seedbed preparation	a/	a/	a/	a/	a/	a/
Plowing	135.50	114.12	74.60	54.45	110.81	87.85
Harrowing	14.30	12.04	14.71	10.74	14.46	11.47
Diking	a/	a/	—	—	a/	a/
Pulling, bundling of seedling	10.47	8.82	24.31	17.74	16.08	12.75
Planting	100.89	84.97	78.44	57.25	91.78	72.77
Irrigation/drainage	a/	a/	—	—	a/	a/
Weeding	25.36	21.36	18.80	13.72	22.70	18.00
Fertilizing	1.76	1.48	5.22	3.81	3.16	250.08
Chemical application	6.50	5.47	1.58	1.15	4.50	3.57
Harvesting, threshing & hauling	233.83	196.95	346.03	252.57	164.76	130.62
Drying	5.20	4.38	3.11	2.27	4.35	3.45
Other crop work	4.25	3.58	2.40	1.75	3.50	2.77
Other variable cash expenses	3.56	3.00	4.19	3.06	3.81	3.02

a/ Less than ₱1.00

Table 27 — (Cont'd.)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
	(in pesos)					
NON-CASH	2280.19	1920.51	1809.24	1320.61	2113.02	1678.13
Harvester-thresher's share	875.26	737.20	674.73	492.50	793.96	1629.46
Irrigation fee in kind	51.41	43.30	—	—	51.41	43.30
Landlord's share	1047.22	882.04	840.55	613.54	963.44	763.81
Other variable non-cash costs	64.53	54.35	64.51	47.09	64.39	51.04
Unpaid family labor	241.77	203.62	229.45	167.48	239.82	190.52
Seedbed preparation	11.95	10.06	15.39	11.23	13.34	10.58
Plowing	45.63	38.43	58.24	42.51	50.74	40.23
Harrowing	45.54	38.36	47.03	34.33	46.15	36.59
Diking	8.22	6.92	2.55	1.86	5.92	4.69
Pulling, bundling of seedling	18.71	15.76	10.24	7.47	15.27	12.11
Planting	7.11	5.99	9.86	7.20	8.23	6.52
Irrigation/drainage	7.54	6.35	—	—	7.54	6.35
Weeding	41.31	34.79	19.71	14.39	32.55	25.81
Fertilizing	10.28	8.66	7.80	5.69	9.28	7.35
Chemical application	15.68	13.20	16.88	12.32	16.16	12.82
Harvesting/threshing, hauling	15.60	13.14	25.41	18.55	19.58	15.52
Drying	11.92	10.04	13.66	9.97	12.62	10.01
Other crop work	2.28	1.92	2.68	1.96	2.44	1.94
Non-cash expense	—	—	—	—	—	—
TOTAL VARIABLE COSTS	3195.06	2691.08	2637.80	1925.38	2878.87	2532.96
RETURNS ABOVE VARIABLE CASH COSTS	3742.34	3152.04	2363.25	2089.98	3499.98	2527.12
RETURNS ABOVE VARIABLE NON-CASH COSTS	2377.02	2002.10	1882.57	1374.14	2152.81	1703.82
GROSS MARGIN/PROFIT OR LOSS	1462.15	1231.53	1054.01	769.37	1386.96	848.99

Table 28. PURE LOWLAND PALAY, DRY SEASON: Costs and returns by irrigation type, 89 farms, Iloilo Province, 1976

(MASAGANA 99 PARTICIPANTS)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
FARMS REPORTING (No.)	65		24		89	
AVERAGE HARVEST AREA (Ha.)	1.14		1.22		1.16	
TOTAL PRODUCTION (Kgm.)	3731.23	3266.83	2390.75	1952.96	3369.74	2894.30
GROSS INCOME (P)	3606.47	3157.60	2287.48	1868.59	3250.79	2792.12
VARIABLE COSTS	(in pesos)					
CASH	821.21	719.00	502.17	410.20	740.02	635.89
Fertilizer expense	248.02	217.15	130.80	106.84	216.40	185.87
Seed expense	—	—	—	—	—	—
Chemical expense	87.44	76.56	44.13	36.05	75.76	65.07
Hired labor expense	481.90	421.92	327.24	267.31	444.01	381.58
Seedbed preparation	a/	a/	a/	a/	a/	a/
Plowing	144.87	126.84	32.89	26.86	114.67	98.49
Harrowing	9.56	8.37	12.33	10.07	10.31	8.85
Diking	1.37	1.20	a/	a/	1.11	a/
Pulling, bundling of seedlings	5.51	4.83	13.96	11.40	7.79	6.69
Transplanting	83.05	72.71	58.58	47.86	76.45	65.66
Irrigation/drainage	3.57	3.12	—	—	3.57	3.12
Weeding	17.41	15.24	19.58	16.00	17.99	15.46
Fertilizing	1.64	1.44	1.04	.85	1.48	1.27
Chemical application	6.00	5.25	1.92	1.56	4.90	4.20
Harvesting, threshing & hauling	198.10	173.45	185.90	151.86	194.81	167.33
Drying	5.90	5.16	—	—	5.90	5.16
Other crop work	4.69	4.11	—	—	4.69	4.11
Other variable cash expenses	3.85	3.37	—	—	3.85	3.37

a/ Less than ₱1.00

Table 28 — (Cont'd.)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
	(in pesos)					
NON-CASH	1857.22	1626.05	1282.13	1047.35	1713.05	1472.44
Harvester-thresher's share	649.37	568.55	387.83	316.81	578.84	497.17
Irrigation fee in kind	62.03	54.31	—	—	62.03	54.31
Landlord's share	802.33	702.47	621.40	507.61	753.54	647.22
Other variable non-cash costs	84.58	74.05	36.18	29.56	64.67	55.55
Unpaid labor	258.91	226.67	236.72	193.37	253.97	218.19
Seedbed preparation	10.23	8.96	16.11	13.16	11.82	10.15
Plowing	46.08	40.34	68.66	56.09	52.17	44.81
Harrowing	48.96	42.86	41.60	33.98	46.97	40.34
Diking	5.81	5.08	2.09	1.71	4.80	4.13
Pulling, bundling of seedlings	26.29	23.02	11.02	9.00	22.17	19.04
Transplanting	11.09	9.71	12.18	9.95	11.39	9.78
Irrigation/drainage	3.90	3.41	—	—	3.90	3.41
Weeding	53.07	46.46	21.39	17.47	44.52	38.24
Fertilizing	12.26	10.74	9.32	7.61	11.47	9.85
Chemical application	7.40	6.48	10.25	8.38	8.17	7.01
Harvesting, threshing-hauling	18.00	15.76	36.48	29.80	22.98	19.74
Drying	13.68	11.98	5.00	4.08	11.34	9.74
Other crop work	2.14	1.87	2.62	2.14	2.27	1.95
TOTAL VARIABLE COSTS	2678.43	2345.05	1784.30	1457.55	2453.07	2108.33
RETURNS ABOVE VARIABLE CASH COSTS	2785.26	2438.60	1785.31	1458.39	2510.77	2156.23
RETURNS ABOVE VARIABLE NON-CASH COSTS	1749.25	1531.55	1005.35	821.24	1537.74	1319.68
GROSS MARGIN/PROFIT OR LOSS	928.04	812.55	503.18	411.04	797.72	683.79

Table 29. PURE LOWLAND PALAY, WET SEASON: Costs and returns by irrigation type, 23 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
FARMS REPORTING (No.)	8		15		23	
AVERAGE HARVEST AREA (Ha.)	1.84		0.91		1.23	
TOTAL PRODUCTION (Kgm.)	4613.74	2510.88	1388.97	1529.70	2371.82	2039.00
GROSS INCOME (P)	4332.38	2357.76	1330.27	1465.06	2374.48	1928.43
VARIABLE COSTS	(in pesos)					
CASH	1041.00	566.54	158.97	164.95	599.52	395.06
Fertilizer expense	263.00	143.13	22.07	24.30	105.87	85.98
Seed expense	—	—	19.67	21.66	33.96	27.58
Chemical expense	60.75	33.06	117.23	118.99	369.69	281.50
Hired labor expense	717.25	390.35	—	—	—	—
Seedbed preparation	—	—	8.00	1.91	109.74	89.12
Plowing	300.50	163.54	2.67	2.94	7.50	6.09
Harrowing	16.56	9.01	—	—	3.25	1.77
Diking	3.25	1.77	14.73	16.22	22.04	17.90
Pulling, bundling of seedlings	35.75	19.46	34.68	38.19	75.25	61.11
Transplanting	151.31	82.35	—	—	a/	a/
Irrigation	a/	a/	6.25	3.67	13.39	10.88
Weeding	32.25	17.55	—	—	2.44	2.33
Fertilizing	2.44	1.33	a/	a/	3.56	2.90
Chemical application	9.25	5.03	47.17	51.95	65.24	52.99
Harvesting, threshing & hauling	99.12	53.94	47.17	51.95	65.24	52.99
Drying	63.50	34.56	—	—	63.50	34.56
Other crop work	2.50	1.36	3.20	3.52	—	—
Other variable cash expenses	—	—	—	—	2.96	2.40

a/ Less than ₱1.00

Table 29 — (Cont'd.)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
	(in pesos)					
NON-CASH	1673.10	778.27	518.52	712.54	934.25	751.82
Harvester-thresher's share	788.10	428.90	161.90	178.30	279.71	308.38
Irrigation fee in kind	16.50	8.98	—	—	16.50	8.98
Landlord's share	342.82	186.57	201.36	363.32	334.39	271.57
Other variable non-cash costs	4.45	2.42	1.87	2.06	2.76	2.24
Unpaid labor	525.68	151.40	153.39	168.86	200.89	160.65
Seedbed preparation	13.77	7.49	7.95	8.76	9.97	8.09
Plowing	48.37	26.33	46.08	50.75	46.88	38.07
Harrowing	43.81	23.84	33.60	36.93	37.15	30.17
Diking	6.16	3.36	1.77	1.95	3.30	2.68
Pulling/bundling of seedlings	13.16	7.16	7.42	8.17	9.42	7.65
Transplanting	11.11	6.05	3.74	4.12	6.30	5.12
Irrigation	6.82	3.71	—	—	6.82	3.71
Weeding	23.14	12.60	15.94	17.55	18.44	14.98
Fertilizing	4.80	2.61	1.17	1.29	2.44	1.98
Chemical application	5.55	3.02	4.28	4.72	4.72	3.84
Harvesting/threshing/hauling	94.44	51.39	29.97	33.00	50.41	40.94
Drying	4.55	2.48	1.47	1.62	2.54	2.06
Other crop work	2.50	1.36	—	—	2.50	1.36
TOTAL VARIABLE COSTS	2714.10	1344.81	677.49	877.49	1443.77	1146.82
RETURNS ABOVE VARIABLE CASH COSTS	3291.38	1791.22	1171.30	1300.11	1864.94	1533.43
RETURNS ABOVE VARIABLE NON-CASH COSTS	2659.28	1579.49	611.75	652.52	1440.23	1176.61
GROSS MARGIN/PROFIT OR LOSS	1618.28	1012.95	652.78	587.57	930.71	781.61

Table 30. PURE LOWLAND PALAY, DRY SEASON: Costs and returns by irrigation type, 14 farms, Iloilo Province, 1976

(NON-MASAGANA 99 PARTICIPANTS)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Hectare Per
FARMS REPORTING (No.)	7		7		14	
AVERAGE HARVEST AREA (Ha.)	1.48		0.98		1.23	
TOTAL PRODUCTION (Kgm.)	3737.92	2515.91	912.71	928.63	2325.32	1883.94
GROSS INCOME (₱)	3533.14	2378.07	897.14	912.79	2215.14	1794.68
VARIABLE COSTS			(in pesos)			
CASH	719.42	484.20				
Fertilizer expense	136.97	92.20	140.76	142.91	487.75	379.32
Seed expense	—	—	9.59	9.75	73.27	59.36
Chemical expense	78.43	52.79	—	—	—	—
Hired labor expense	504.02	339.21	6.61	6.73	42.52	34.45
Seedbed preparation	—	—	124.56	126.43	371.96	825.51
Plowing	172.85	116.34	a/	a/	a/	a/
Harrowing	37.57	25.28	8.57	8.72	90.71	73.49
Diking	7.14	4.80	4.28	4.36	20.92	16.95
Pulling/bundling of seedlings	17.14	11.53	—	—	7.14	4.80
Transplanting	42.42	28.55	20.77	21.13	18.95	15.35
Irrigation	a/	a/	14.95	15.21	28.69	23.24
Weeding	12.57	8.46	—	—	a/	a/
Fertilizing	23.14	15.57	7.14	7.26	9.85	7.98
Chemical application	28.14	18.94	—	—	23.14	15.57
Harvesting/threshing/hauling	106.95	71.99	—	—	28.14	18.94
Drying	48.57	32.69	68.0	69.18	87.47	70.87
Other crop work	7.14	4.80	—	—	7.14	4.80
Other variable cash expenses	—	—	—	—	—	—

a/ Less than ₱1.00

Table 30 — (Cont'd.)

ITEM	IRRIGATED		NON-IRRIGATED		ALL PALAY	
	Per Farm	Per Hectare	Per Farm	Per Hectare	Per Farm	Per Hectare
	(in pesos)					
NON-CASH	1447.12	968.00	503.98	512.75	988.53	797.29
Harvester-thresher's share	614.68	413.73	142.86	145.35	378.77	306.88
Irrigation fee in kind	16.00	10.76	—	—	16.00	10.76
Landlord's share	309.37	208.23	228.57	232.56	268.93	217.88
Other variable non-cash costs	—	—	—	—	—	—
Unpaid labor	507.07	335.28	132.55	134.84	324.83	261.77
Seedbed preparation	22.95	15.45	2.17	2.20	12.56	10.17
Plowing	154.25	103.82	55.91	56.88	105.08	85.13
Harrowing	37.02	24.92	29.75	30.27	33.39	27.05
Diking	5.90	3.97	—	—	5.90	3.97
Pulling/bundling of seedlings	37.57	25.28	4.45	4.52	21.01	17.02
Transplanting	26.05	17.53	1.02	1.04	13.54	10.97
Irrigation	4.12	2.77	—	—	4.12	2.77
Weeding	26.21	17.64	7.64	7.77	16.92	13.71
Fertilizing	10.90	7.33	1.37	1.39	6.13	4.97
Chemical application	1.45	1/	2.52	2.57	1.99	1.61
Harvesting/threshing/hauling	177.78	119.66	25.84	26.29	101.81	82.48
Drying	2.87	1.93	1.88	1.91	2.38	1.92
Other crop work	—	—	—	—	—	—
Other variable non-cash costs	—	—	—	—	—	—
TOTAL VARIABLE COSTS	2166.54	1452.20	644.74	655.66	1476.28	1176.61
RETURNS ABOVE VARIABLE CASH-COSTS	2813.72	1893.87	756.38	769.88	1727.39	1414.68
RETURNS ABOVE VARIABLE NON-CASH COSTS	2086.02	1410.07	393.16	400.04	1226.61	997.39
GROSS MARGIN/PROFIT OR LOSS	1366.60	925.87	252.40	257.13	738.86	618.07

FIGURE 1

PADDY: PRODUCTION, BY CROP TYPE, PHILIPPINES, CROP YEARS 1960-1977

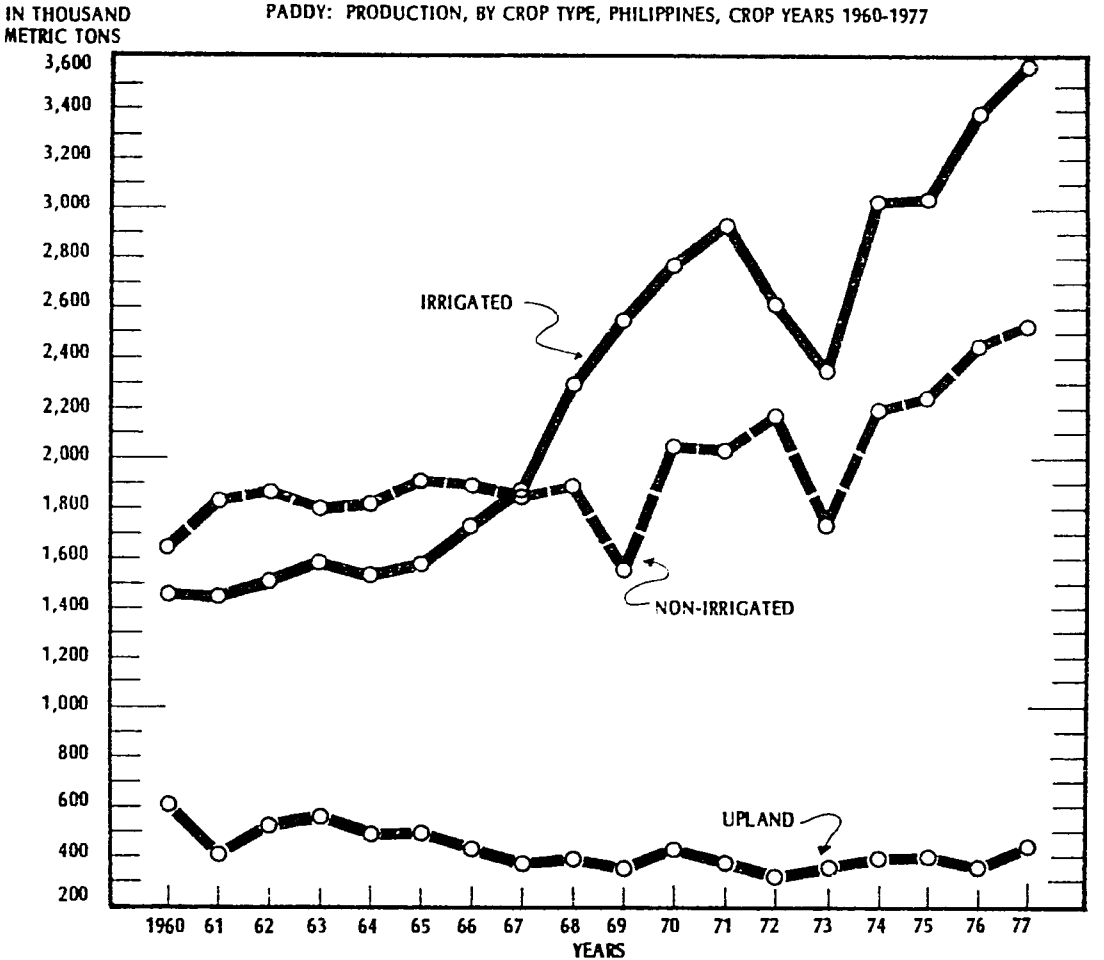
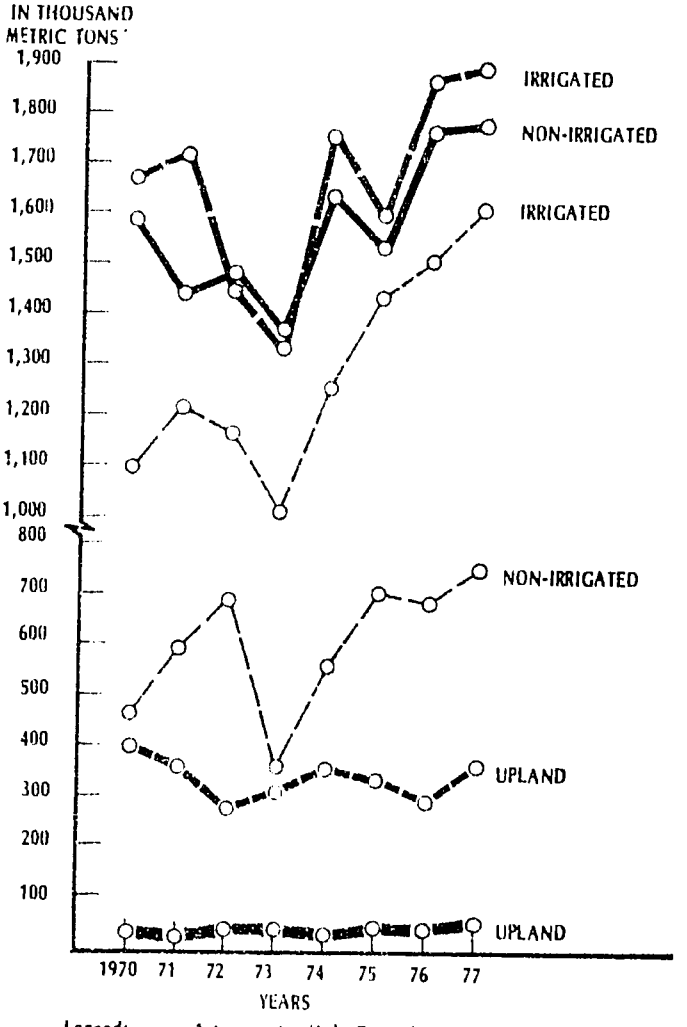


FIGURE 2

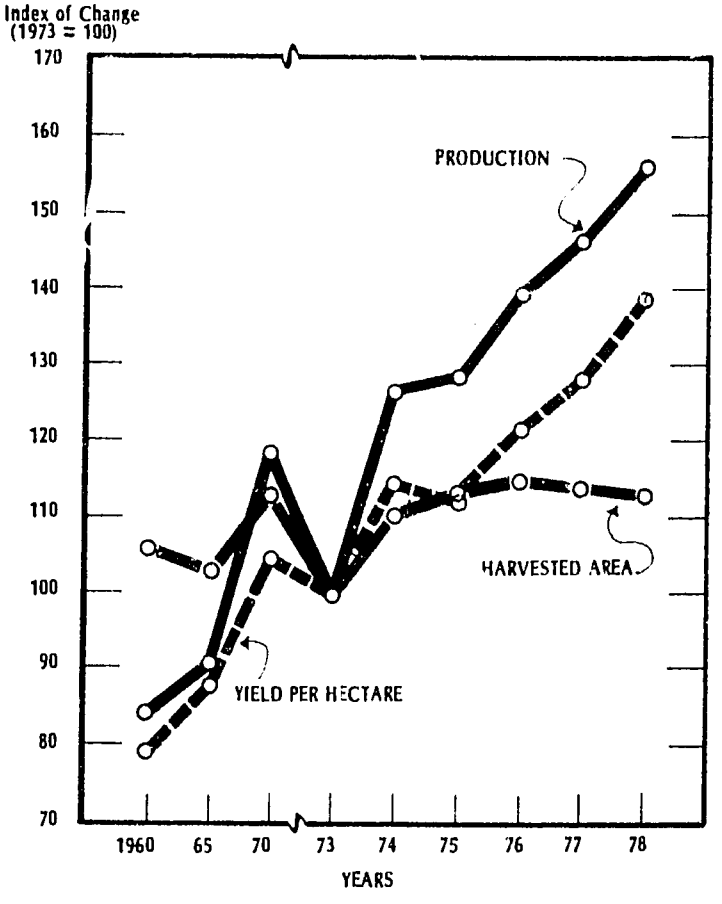
PADDY PRODUCTION, BY CROP TYPE, BY SEMESTER, CROP YEARS 1970-1977



Legend: —— 1st semester (July-December)
— — — 2nd semester (January-June)

Source: Table 3

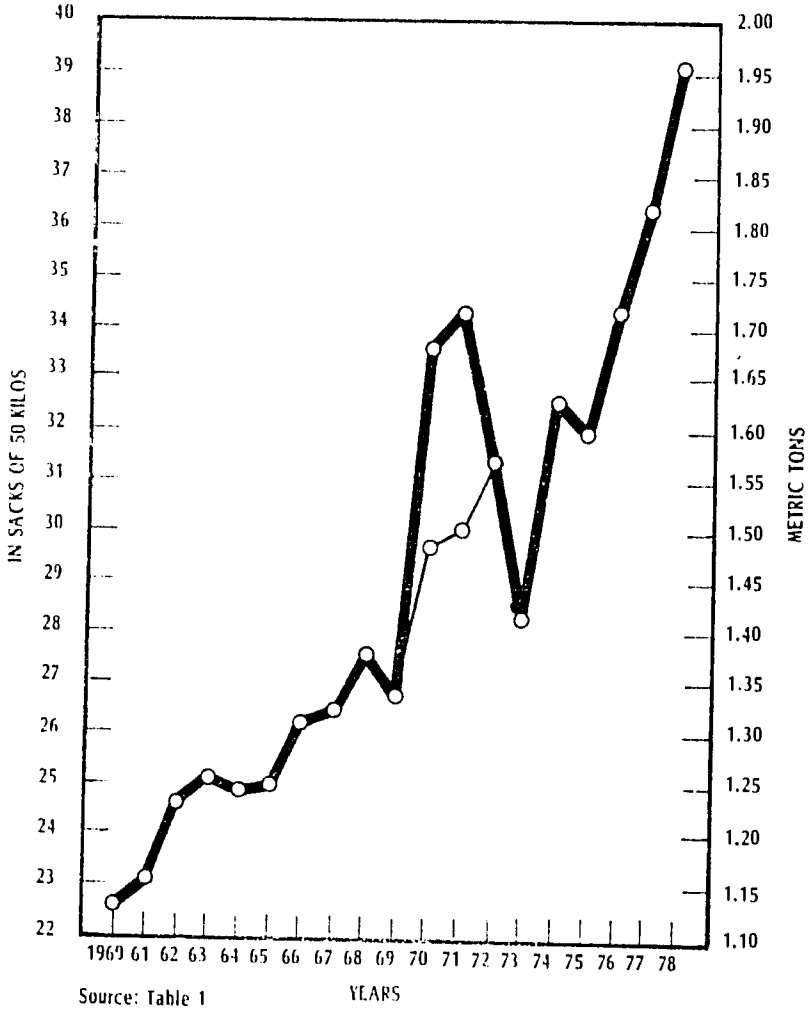
FIGURE 3
PADDY AREA, YIELD AND PRODUCTION, PHILIPPINES, 1960-1978



Source: Table 1

FIGURE 1

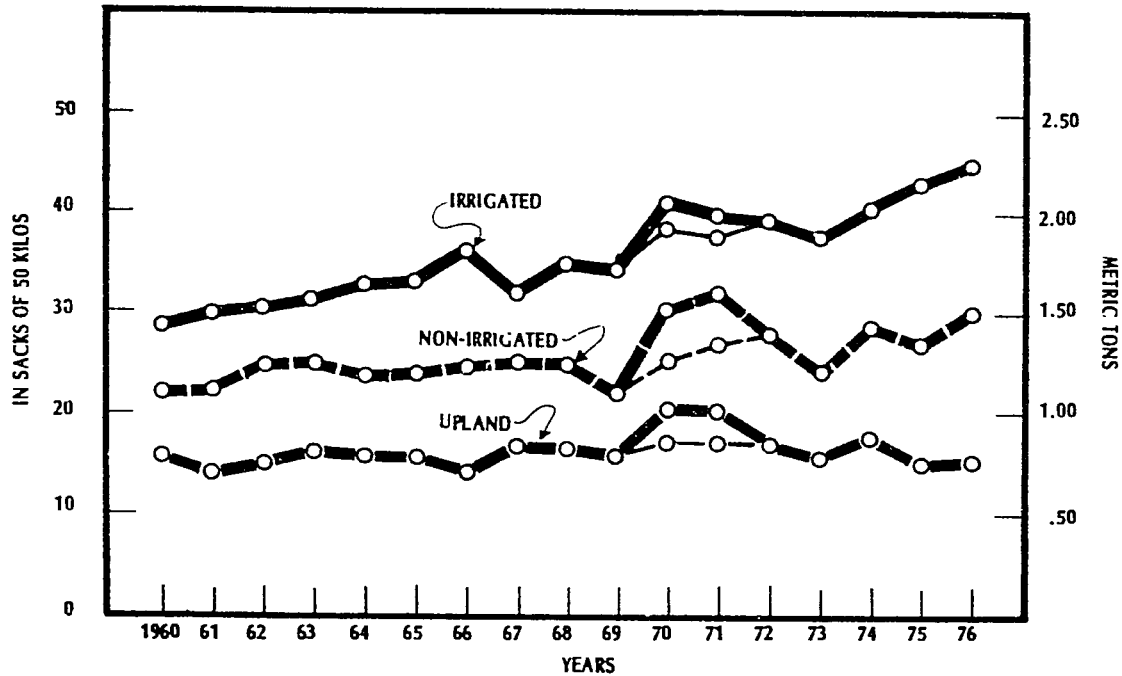
PADDY: YIELD PER HECTARE, PHILIPPINES, CY 1960-1978



Source: Table 1

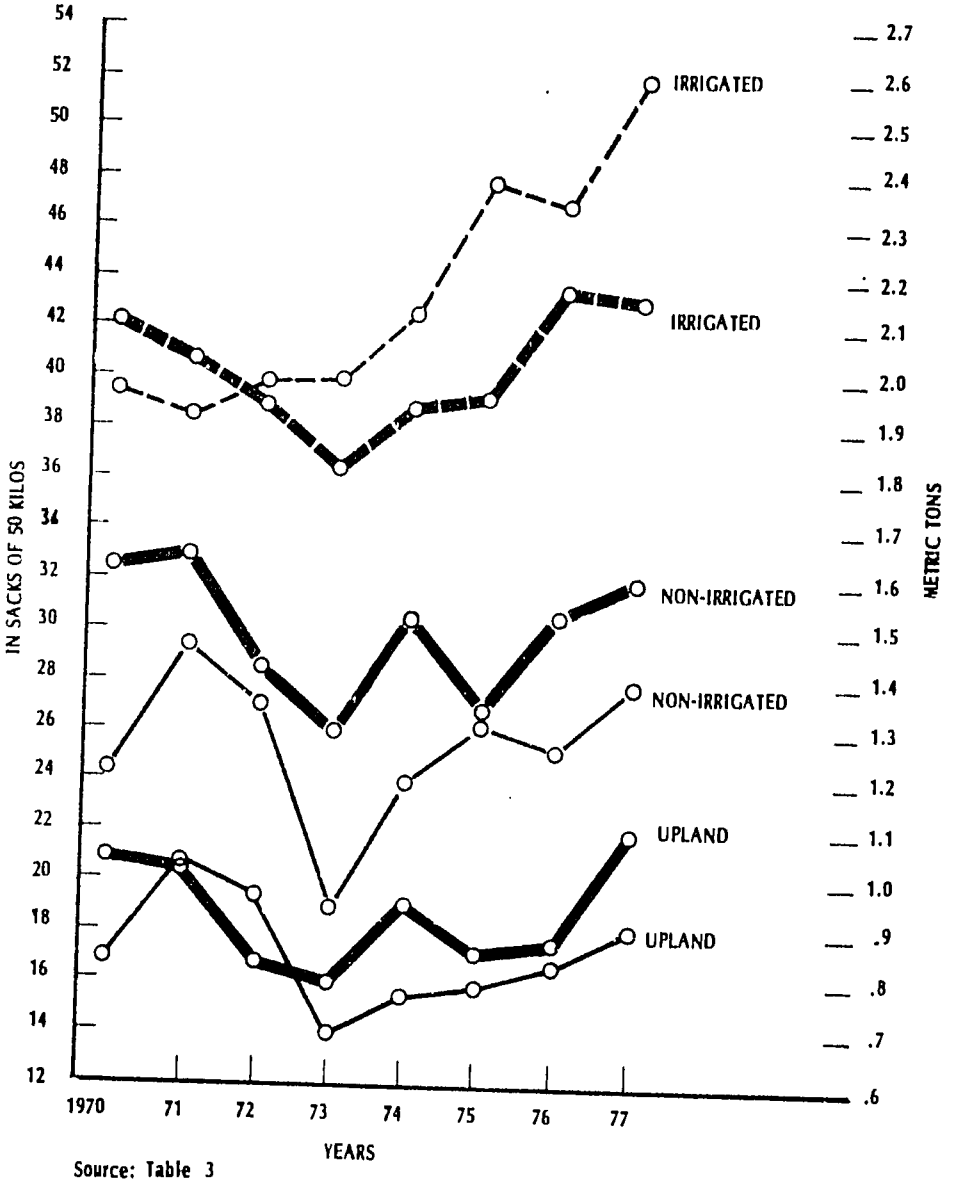
FIGURE 5

PADDY: YIELD PER HECTARE, BY CROP TYPE, CROP YEARS 1960-1976



Source: Table 2

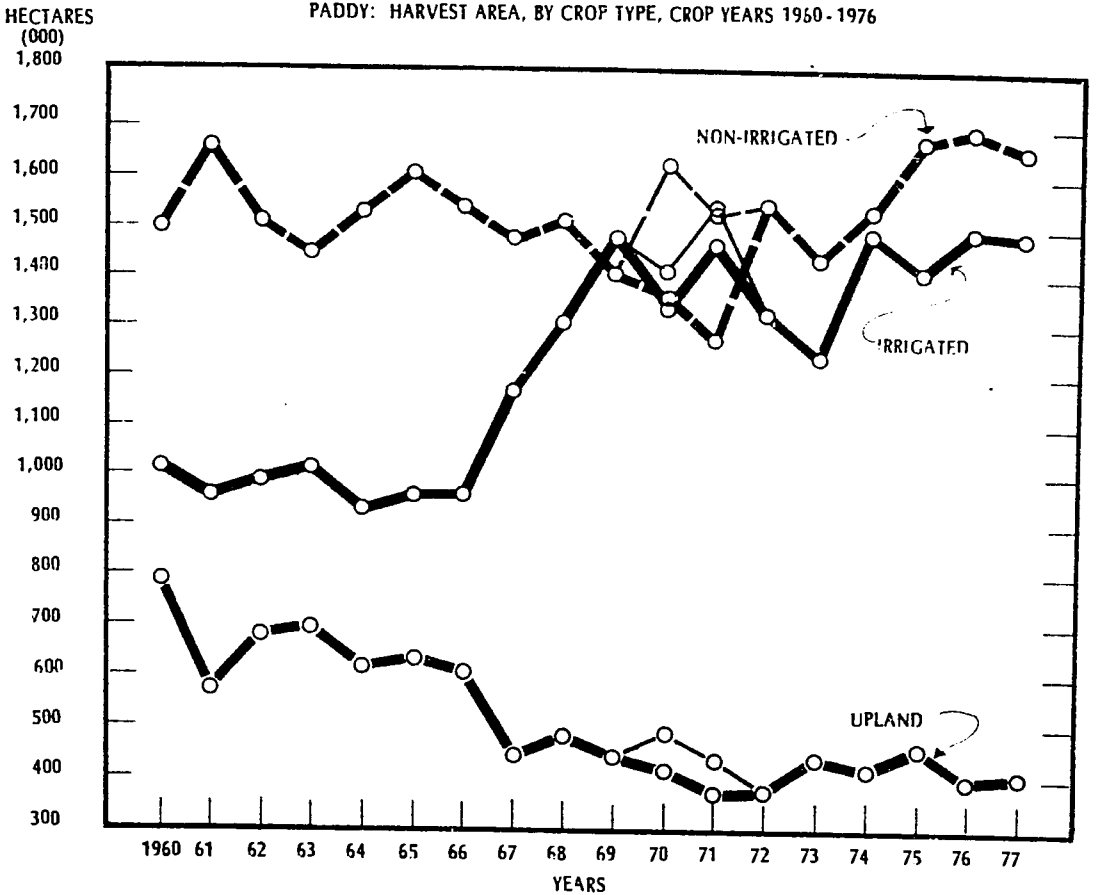
FIGURE 6
PADDY: YIELD PER HECTARE, BY CROP TYPE, BY SEMESTER,
CROP YEARS 1970-1977



Source: Table 3

FIGURE 7

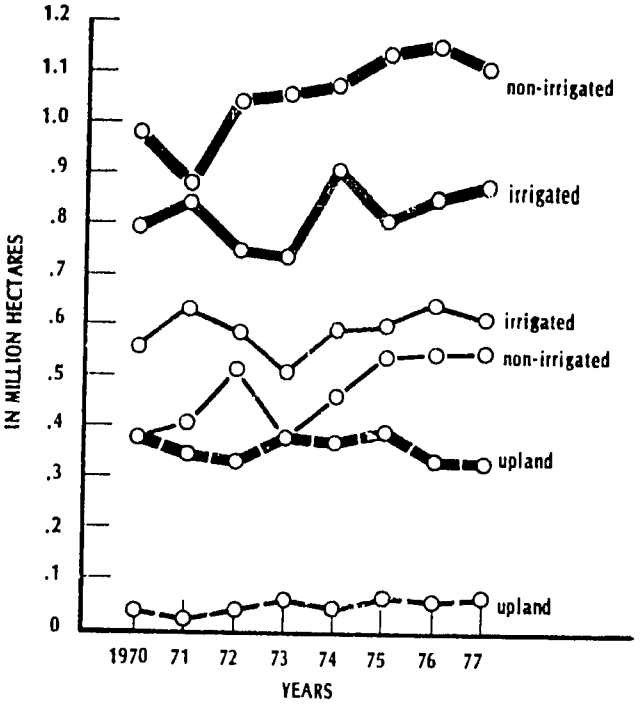
PADDY: HARVEST AREA, BY CROP TYPE, CROP YEARS 1960-1976



Source: Table 2

FIGURE 8

PADDY: HARVEST AREA, BY CROP TYPE, BY SEMESTER, CROP YEARS 1970-1977



Legend: —— 1st semester (July-December)
– – – 2nd semester (January-June)

Source: Table 3

REFERENCES

1. Abarientos, Ernesto *et al.* Costs and returns of producing palay in Laguna. Department of Agricultural Eonomics, UP College of Agriculture.
2. Alcachupas, Ramon C. *et al.* 1975. An analysis of farm record-keeping in Nueva Ecija, 1970-1971. Bureau of Agricultural Economics, Quezon City.
3. Alix, Jesus C. 1978. The Masagana 99 program and farm record-keeping: The Philippines' macro-micro approach to small-farmer development. Paper prepared for the FAO-Expert Group meeting on Farm Management for Small-Farmer Development in Asia and the Far East, Bangkok, Thailand, September 11-16, 1978.
4. Alix, Jesus C., D.E. Kunkel and L.A. Gonzales. 1978. Analyzing statistics on palay production, area, yield, stock inventory and the Masagana 99 program. Bureau of Agricultural Economics, Quezon City.
5. Atkinson, L. Jay and D.E. Kunkel. 1976. High-yielding varieties of rice in the Philippines (Foreign Agricultural Economics Report No. 113), U.S. Department of Agriculture, Washington, D.C.
6. Cañete, Constancio. 1978. The income level and income distribution impact of Masagana 99 program in Central Luzon, Philippines. Doctoral dissertation, Purdue University, Lafayette, Indiana.
7. David, Cristina Crisostomo. Macro-micro fertilizer demand in selected Asian farms. Paper presented at the Stanford Seminar on the Political Economy of Rice, IRRI, College, Laguna, July 4, 1974.
8. Iglesias, Gabriel, 1977. The Philippines' rice self-sufficiency program. Case study 5, East-West Center, Honolulu, Hawaii.
9. Quisumbing, Edgardo *et al.* 1978. An evaluation of the Masagana 99 program. An update of a paper first presented at the conference on Strategic Factors in Rural Development in East and Southeast Asia held in Manila, Dcember 18-23, 1976. Ministry of Agriculture, Quezon City. 17 p. (mimeo).
10. Rodriguez, Gil R. 1974. Fertilizer supply and demand: An econometric approach. (Research Report No. 6), Bureau of Agricultural Economics, Quezon City.

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