PRELIMINARY AND
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THE HIGH-YIELDING VARIETIES OF RICE IN THE PHILIPPINES: A PERSPECTIVE

by

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The High-Yielding Varieties of Rice in the Philippines: A Perspective*

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1.1 Social Objectives

The development and application of high-yielding varieties (HYVs for short) of rice in the Philippines has had varied implications for farmers, landowners, urban consumers, rice traders, industrial workers, government officials, etc. An evaluation of these implications in the social sense must rest on the objectives or values held with respect to rice by Philippine society. While some of these values have been well articulated, others seem latent, and hence a restatement will be attempted here.

When objectives are mentioned, the phrase first in mind is of course "self-sufficiency," which the Philippines, along with nearly every rice producing country in the world,[1/] has declared to be a national objective. Yet it is not the prime objective. It should be apparent to anyone familiar with the "rice crises" of the postwar period that a prior objective is

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1/ Cf. Food and Agriculture Organization (U.N.), National Rice Policies 1966, Rome 1966.

to attain a level of security and contentment, somehow defined, for the rice consumers, specifically the urban consumer. All such crises were characterized by an overly-high retail price of rice, to which all segments of society with voices of significant size gave heated complaint. Such segments include the political leaders, regardless of party or of ideological color, the mass-media, and other spokesmen of the urban consumer. Any historian would find great difficulty locating statements which defend or justify rice prices during the times which urban spokesmen have labelled as "crises". Although the body of rice farmers and their households, plus rice millers and traders and the landowning families constitute a large portion of the Philippine population, one will not find evidence that Philippine society gives preference to their welfare over the welfare of urban consumers. The fairness of such treatment can be judged only by the Filipinos themselves. In the Philippines it is so clear as to be taken for granted but for the interested outsider it might be especially stressed that the first criterion by which Philippine society gauges the HYV is their capacity to prevent, or at least weaken, crises of the consumer price of rice. (over high retail price)

There is an important equity aspect to this main objective. It seems clear that Philippine society reacts to the price of rice in nominal or current terms, rather than in terms of, or relative to, prices of goods and services in general. Thus, although the price of rice might increase simply on account of

inflation, the urban sector will nevertheless focus its ire on the rice industry. This is due not so much to ignore of economics but to the anti-equity character of inflation. It is those with fixed incomes, such as government employees, those in regulated industries, such as jeepney drivers, and those whose assets are in savings accounts rather than real property, i.e., those in the urban sector who are poorer off to begin with, who are hurt by inflation, and who naturally focus on the one most important price, that of their staple food. The demand by the leaders of society that the price of rice should not increase, in spite of the general pressure on all prices, is an attempt to prevent the distribution of real income among urban people from worsening. Thus, although national welfare is viewed with a bias towards the urban rather than the rural, it has something of a compensating bias towards the urban poor rather than the urban rich.

The second objective is that of "self-sufficiency." Almost all those who calculate[2/] or review Philippine rice shortages cite the presence of rice imports as evidence of insufficiency, so that it would appear that Philippine society's conception of self-sufficiency is the absence of imported rice

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[2/] It will be argued later that the procedures used have been technically faulty, such that both the policy-makers and those who have wished to influence them have been muddling through without a clear notion of what self-sufficiency means. But the lack of attention to detail merely underscores the point that self-sufficiency is in fact a secondary objective.

under prices which are reasonably low by some standard. In the first place, attainment of this may imply some savings in foreign exchange, which is helpful to a country suffering chronically from balance of payments problems. For a large volume of imports, say half a million metric tons of polished rice, the cost would amount to about 5% of Philippine imports of all goods and services. This overstates the case, however, since it is quite possible to attain self-sufficiency through diversion of land to rice from internationally traded crops, viz., sugar, which under the U.S. quota system is a leading export, and corn, of which imports are required for animal feed.[3/] If self-sufficiency in rice had no net balance of payments implications, we would judge that Philippine society would nevertheless hold it as a high objective. In searching for a rationale for this anti-imports feeling, our hypothesis is that there is a latent desire to avoid leverage being applied on this society from foreign sources of this critically important food. This bears a similarity to a third major objective.

Thirdly, this society desires that aliens be excluded from all activities closely linked to the production and distribution of rice. The legal expression of this desire has been in force for some time. Republic Act No. 3018, which took effect on January 1, 1961, stipulated that after the end of 1963

[3/] The responsiveness of land allocation among these three crops to their relative prices was studied in Mahar Mangahas, Aida R. Librero and V.W. Ruttan, Price and Market Relationships for Rice and Corn in the Philippines, IRRI, 1970.

only Filipinos could legally engage in rice and corn production, processing and trade. A Rice and Corn Board was organized to implement the measure. It is obvious nevertheless that a great number of citizen-wholesalers are of Chinese descent, and, indeed, some maintain close connections with their home country. The frequent denunciations of "unscrupulous middlemen" are reflections which mix racial prejudice with a suspicion of monopolistic exploitation.

Fourthly, there is a desire to raise the living standards of the farmers themselves. Preferably, these standards should increase faster than those of the landowners, money lenders, millers and rice traders, who are so often accused of exploiting the farmers. Thus, although the social bias is against the rural sector, it at least favors the rural poor against the rural rich.

In this study, we attempt to assess the impact of the HYVs in the light of the foregoing objectives. The urban consumer, of course, evaluates the benefits from HYVs in terms of the peso prices he faces. The government must consider how the HYVs affect its program expenditures and its foreign exchange savings. And rural people will be most concerned about the profitability of the HYVs and the manner in which the benefits are shared among the different factors of production. In this last regard there will be need to draw upon primary agricultural data.

The picture has not been as rosy as may have been hoped. The successes of the first years of the HYVs, 1966-1969, were

followed by the problems, some natural and some man-made, both internal and external to the country, of 1970-1972. Some attention will be given to the role of rice in the political economy of these eventful years.

1.2 Political Necessity

The common view is that the Philippines was never self-sufficient in rice until the arrival of the HYVs, but lapsed into insufficiency again after a few years. The evidence commonly cited is the rice import-export record. In the late 1940s, there were large imports, the understandable effects of the destruction to agriculture by the Second World War. Then followed more than a decade and half of intermittent imports, the time pattern bearing a curious relationship to the schedule of elections.[4/]

It should be clear, however, that this record was the result solely of government decisions, since at all times the government has had the sole authority to import or export rice. Therefore, to accept the imports record as an indicator of the deficiency is likewise to accept that the government has had a fair notion of the size of the rice shortage. However, this

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[4/] Presidential and congressional elections were held in 1945 and every four years thereafter until 1969. Local elections were held in 1947 and every four years thereafter until 1971. Elections for one-third of the 24 senators in the upper house of the recently abolished Congress were held every two years, coinciding with presidential and local elections. Thus every odd-numbered year from 1945 to 1971 was an election year.

assumption cannot be granted. In the first place, given the method by which the shortage or surplus has traditionally been estimated, there is no assurance that a shortage will be estimated when there is in fact a surplus, or a surplus when there is in fact a shortage. This will be described in the section on the rice statistical ambiguity. In the second place, there are strong political motivations to use rice imports to further the welfare of urban consumers, particularly those with low incomes or with fixed incomes. We have stated that, whether one considers it fair or not, total welfare as defined by the leaders of society contains a bias for the urban consumer. Election years are particularly opportune times for government leaders to authorize imports, since the intended appeasement of urban voters implies a coincidence between the social welfare and the political welfare of the government officials themselves. In the third place, considering a government not known for freedom from corrupt practices, one should not fail to observe that both the political factors and the statistical ambiguity have made rice imports, which are always arranged on a government to government basis, a tempting source of graft.

Considering the time series on rice imports, the most interesting sub-period is from 1960 to 1967. All the odd-numbered years were election years. In 1960 there were almost no imports, but in the following (presidential) election year, 186,000 metric tons of rice were imported. In the following off-year, again there were no imports. Then in the (local)

lection year of 1963, 256,000 metric tons were imported.[5/] lthough there were importations of 300,000 metric tons in 964, this was dwarfed by the massive imports of 569,000 etric tons in the (presidential) election year of 1965.[6/] hen in 1966 imports fell substantially, to a mere 100,000 etric tons, only to be doubled the following year. From this time onward, the pattern differs, and it does not seem mere coincidence that it coincides with the arrival of the HYVs.

Any Manila resident will recall the typical propaganda during an election year. Although elections are held in November, activity is stirred as early as January or February. This is very soon after the main rice harvest in Central Luzon and in most other regions, and so rice prices at both the farm level and retail level are seasonally low. Nevertheless, as early as this there will be reports and soundings in the press about an impending rice crisis. Some of this propaganda may stem from the administration party, since it wishes imported rice to arrive during the peak of the campaign, from July to November. It realizes that rice prices are seasonally high during the campaign period, and the idea is to try to dampen the seasonal movement and prevent the opposition from

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[5/] It has been observed that, in spite of the imports, prices were higher in 1961 and 1963 than in 1960 and 1962. This can be rationalized under a model which explicitly allows for rice traders to anticipate that the government will arrange imports only every other year. See M. Mangahas, "The Effect of Importation on the Price of Rice," Philippine Review of Business and Economics, 5:2, December, 1968, 30-42.

[6/] Nevertheless, the incumbent Mr. Diosdado Macapagal lost his bid for re-election.

capitalizing too much on high rice prices during the campaign period. The opposition party also has cause to contribute to the propaganda, thus criticizing the administration party for an ineffective agricultural development policy, and in addition preparing the minds of voters for a rice crisis later on in the year.

The political conflict continues in the determination of the size of the rice imports. By law, rice imports cannot be undertaken unless the National Economic Council[7/] certifies to a shortage of a specified amount of rice. This Council was a politically balanced body with a fixed number of seats allocated by law to the majority party and to the minority party. The intention of the law was precisely to place a political check on imports of rice by the majority party.[8/] It would be necessary that the certification of a shortage be made by March, so that imports would arrive in time for the campaign. The minority party would try to capitalize on the administration's claim that imports were needed, and yet would try to minimize the size of the imports as much as possible.[9/]

As soon as the certification was made, implementation of the imports order would be left to the rice agency (throughout

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7/ Now the National Economic and Development Authority.

8/ R.A. No. 3452, created the Rice and Corn Administration (now the National Grains Authority). The RCA, under the Office of the President, would implement the importation of rice, but it required the prior certification of a shortage by the National Economic Council.

9/ Occasionally, the opposition might even be able to

the 1960s and up to 1972, the Rice and Corn Administration). Negotiations with supplier countries could then begin. This would also be the right time for unscrupulous officials to try to divert part of the import fund for themselves. The rice agency would typically have no regular funds budgeted for rice imports, due to the watchful eyes of the minority party during budget proceedings. The administration would therefore have to arrange for a loan, typically from the government-controlled Philippine National Bank, to finance the imports. Over time, these outstanding loans would deteriorate to the nature of bad debts; in effect, a consumer subsidy would have been effected not by Congress but by the administration.

Paradoxically, however, the rice imports were of very little political help. For one thing, somehow they were not effective in decreasing the seasonal peak in the price of rice during the campaign period. No incumbent candidate won reelection to the presidency until 1969. By then, the political strategy had changed. It was the peak of success of the high yielding varieties, no shortage certification proceedings were held, and the administration's election propaganda was that it had solved the rice problem at last.

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block NEC certification of a rice shortage completely. This happened in 1963. The administration then claimed that a buffer stock was needed for the army on account of current conflicts in Southeast Asia, and directed that imports be made for the account of the army as an emergency measure not requiring a NEC certification of a rice shortage.

1.3 Statistical Ambiguity

Imports of rice could not legally be undertaken without a certification to a rice shortage by the National Economic Council. The job of forecasting the size of the shortage was assigned by the Council to an Inter-Agency Committee on Rice and Corn Production and Consumption. The Committee was created on March 13, 1956 by the Office of Statistical Coordination and Standards (OSCAS) of the National Economic Council. Its member agencies were the Bureau of Agricultural Economics, the Rice and Corn Administration (now the National Grains Authority), the Rice and Corn Board, the Food and Nutrition Research Center, the Presidential Economic Staff, the Office of National Planning of the National Economic Council, and OSCAS. The Committee was chaired by the Director of OSCAS.[10/]

This Committee annually forecasts the size of the rice shortage simply by taking a residual of the estimate of "rice requirements" from the forecast of "rice supply". The recommended size of imports is the difference between this residual and a desired buffer stock. The absolute size of the residual has been very small, at most amounting to 10% of total rice requirements and very often less than 5%. This method is obviously very sensitive to errors of estimation in either rice production or in rice requirements. It would be

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[10/] See B.G. Bantegui, "The System of Evaluating the Rice Situation and Formulating Government Rice Policy in the Philippines," Papers and Reviews of the Seminar on Rice and Related Statistics, 1965, University of the Philippines Statistical Center, 1965.

very easy to mistake a condition of shortage for a condition of surplus and vice versa.[11/]

The estimate of production has been the responsibility of the Bureau of Agricultural Economics. Both its forecasts and its final estimates are made on the basis of sample surveys. Over the 1960s, its error of forecast of rice hectarage was almost always 3% or less, and its error of forecast of production was almost always 1% or less of actual production.[12/]

The figures for rice requirements have been much more questionable. They consist mainly of population projections multiplied by benchmark per capita consumption estimate. These benchmarks have been revised about once every ten years. Then some miscellaneous requirements for seed, animal feed, etc. are added. The main problem is that there is no way of checking, after the fact, on the reliability of the requirements forecast. Obviously, population censuses can be held only once in a decade. Thus there is no difference between the forecasted rice requirements and the final estimate of rice requirements. Candidly speaking, however, there has been very little interest in making a check at all. The year after an election, particularly if a new party is in power, there is no interest with respect to the imports of the preceding year, and no intention to

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[11/] See M. Mangahas, "Efficient Forecasting and Philippine Rice Import/Export Policy". It seems possible that there was a surplus mistaken for a shortage in 1967.

[12/] Ibid., Table 6.

engage in imports in the current year. One might even venture to say that the exceedingly high political content in the rice importation procedure rendered as academic any interest in improving the procedure.

The size of the proposed buffer stock is by far the easiest variable to manipulate. The number of days' supply which the buffer stock represents is entirely ad hoc, and no consistent procedure has been applied. Throughout the 1960s, the desired buffer stock (as computed by the Inter-Agency Committee) ranged from as few as zero days' supply to as high as 63 days' supply.

As might be expected, the technical personnel of the Inter-Agency Committee could not be insulated from the political acrimony of the rice importation issue.[13/] The Bureau of Agricultural Economics, in particular, has often been under attack from various quarters whose positions would be improved if the Bureau's forecasts were different. These forecasts, however, are the only ones which are capable of verification, and as the accuracy has been reasonable, the Bureau has usually faced the pressures within a high sense of integrity. In fact, probably its greatest stress came during the peak of success of the HYV, when the complaint from the administration was not that the production forecast was too high but that it was not high enough. At this time, the political

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13/ The Seminar On Rice and Related Statistics (op. cit.) was organized in 1965 in response to the strong statistical bickerings of that election year.

strategy had turned completely around, so that there was a need for high rice surplus computations rather than rice shortage computations by which to justify any rice imports for the forthcoming 1969 election.

1.4 Development of the High-Yielding Varieties

If the development of the HYVs must be associated with one institution, undoubtedly it is the International Rice Research Institute. It was originally conceived in 1958, as a joint project of the Rockefeller and Ford Foundations, founded in 1960, and commenced operations in 1962; for ten fruitful years it was led by Robert F. Chandler, Jr.[14/] For the Philippines, IRRI constituted in effect a tremendous increase in the scale of rice research. Previously, the development of new varieties and other research tasks had been done at a few, poorly funded experiment stations of the Bureau of Plant Industry,[15/] at the College of Agriculture of the University of the Philippines, and at a few other agricultural colleges. The recommended varieties which resulted, termed Philippine Seedboard selections, were however not radical improvements over the traditional varieties.

Traditional Philippine rice varieties are generally tall, leafy, profuse tillering, photoperiod-sensitive and susceptible

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14/ See R.F. Chandler, Jr., "IRRI - The First Decade" in International Rice Research Institute, Rice, Science and Man, Los Baños, Philippines, 1972.

15/ Cf. Eugenio Cruz, Completed Researches on Rice and Corn by the Bureau of Plant Industry Under the Rice and Corn Production Program 1957-1965, Manila, Bureau of Plant Industry, Department of Agricultural and Natural Resources, 1966.

to lodging. They are able to produce moderate but stable yields even in adverse conditions such as deep water and intense weed competition, and they are adapted to conditions of low fertility and little protection. Photoperiod-sensitive varieties have been naturally selected where there is little water control, since they may be planted whenever monsoon rains begin, and yet will always mature at a fixed date after the monsoon season, when harvesting is easier and the chance of typhoon damage at late stages of growth reduced. Yield increases through a high rate of application of nitrogen or dense planting are not largely due to lodging susceptibility. Lodging also raises the cost of harvesting and lowers the quality of the grain. The HYV for their part are short and stiff-strawed, with short, narrow and erect leaves, are medium tillering and of early maturity, and are capable of substantial grain response to nitrogen without lodging.[16/]

Demonstration of varietal superiority was carried out chiefly on the experimental farm. The important experimental areas are Los Baños, Laguna, site of IRRI and the U.P. College of Agriculture, and Muñoz, Nueva Ecija, site of the Maligaya Rice Research and Training Center. In order to maximize yields, experiments took advantage of well-irrigated lowland conditions with varied dosages of modern complementary inputs such as fertilizer and protective chemicals. Response to nitrogen was the most important attribute for which the new varieties were bred. The importance of irrigation per se is obvious, and

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16/ U.P. College of Agriculture and International Rice Research Institute, Rice Production Manual, Los Baños, 1967.

experimental resources are not spent on quantifying the contribution.[17/]

Agronomic superiority can be sufficiently described by the absolute difference between the yield of a representative new variety and that of a representative old variety, at least with respect to irrigated land. The evidence that follows indicate that on irrigated land there is no significant difference, as may have been anticipated,[18/] between yield variances of new and old varieties on account of weather and disease factors.

Experiments at Maligaya during 1966, 1967 and 1968 have provided a range of nitrogen response functions for IR8 (a new short-stemmed indica) and Peta (a traditional tall indica). These functions are reproduced in Figure 1. Response function variation is much greater in the wet seasons, as there is a greater incidence of typhoons, floods, droughts and concomitant diseases. The 1966 wet season functions are the 'best', as there was no unusual weather or crop damage. And the 1967 wet season functions are the 'worst'; there was a bad typhoon, incidence of bacterial leaf blight, and lodging in the case

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17/ Rather, the experiments actually made concern depth of flooding, length of time flooding, length of time flooded, etc.

18/ In the context of the subsistence farmer's attitude towards innovations, Wharton has considered the possibility that HYV may have a favorable mean yield differential but an unfavorable yield variance differential. See Clifton R. Wharton "Risk, Uncertainty and the Subsistence Farmer: Technological Innovation and Resistance to Change in the Context of Survival, paper presented at a joint session of the American Economic Association and the Association for Comparative Economics, Chicago, 28 December 1968.

of Peta. (Although there was a serious drought in Central Luzon in the wet season of 1968, irrigation was adequate in Maligaya.) The mean yield corresponding to any nitrogen level of 40 kg/ha or more is always greater for IR8; at lower nitrogen levels the functions sometimes cross. If for a given nitrogen level we use all three functions to obtain a range of achieved yields under varying weather conditions, and let range be an indicator of variance, we find in either season that the range of achieved yields is no greater for IR8 than for Peta.[19/]

Season is another important factor. Cet., par., the irrigated dry season yield is expected to be significantly higher than the irrigated wet season yield, because of the greater supply of solar energy and the absence of typhoons.[20/] In addition to Figure 1, we may refer to Figure 2, which contains experimental nitrogen response functions for each season at two locations. At Maligaya, the difference between the yield of IR8 and that of Peta is greater for the dry season for most nitrogen levels. This is also true at IRRI, for nitrogen levels of 80 kg/ha or over; at 60 kg/ha or less, the wet season yield differential is greater. But at the recommended (1967) levels of nitrogen for IR8--100 kg N/ha in

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[19/] IRRI, Annual Report for 1968, Los Baños.

[20/] This is usually not reflected in national yields, because often dry season irrigation is less plentiful due to a shortage of water storage facilities.

the dry season and 70 kg N/ha in the wet season[21]--the yield differences are greater for the dry season at both locations. The obvious inference is that the probability of adoption of an HYV is higher for a farm with adequate irrigation for two seasons.

The significance of fertilizer is clear from Figures 1 and 2: in general, the yield differential increases with the quantity of nitrogen applied per hectare. Figure 3 presents the results of a wet season experiment using three levels of protective chemical inputs (I, II, III) on IR8 and on Sigadis, a tall weak-strawed variety. Considering the vertical distances between the IR8 function and the Sigadis function, the improvement in the yield differential as a consequence of an increase in protective chemicals appears to be slight. The picture might be incomplete, however, since level I does not refer to zero application, which is a common condition on Philippine farms.[22] There may well be a large improvement in the yield differential as one proceeds from a zero level to level I.[23]

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[21] Rice Production Manual, p. 180.

[22] Cf. Von Oppenfeld et al., Farm Management, Land Use and Tenancy in the Philippines, University of the Philippines, Central Experiment Station Bulletin I, Los Baños, 1957.

[23] See S. K. De Datta and Randolph Barker, "Management Practices and Economic Analysis of Experimental Results in Rice Production," in Economics of Rice Production. Although De Datta and Barker refer to three levels of "management," their five management operations include application of (1) a seedbed spray, (2) a field spray, (3) a systematic insecticide, (4) an herbicide, and (5) handweeding. Only operation (4) is held at zero for level I. Handweeding is constant for levels I and II (one complete weeding); for level III one light weeding is added.

1.5 Early Successes, 1966 to 1969

Soon after the International Rice Research Institute began operations in 1962, numerous rice varieties, some taken directly from other countries, and some developed by the Institute, began to be planted in scattered parts of the country. For the most part, this was within the Institute's scheme of field testing of their varieties, and the natural regions of concentration were the surrounding localities in Laguna and points in the Central Luzon Plain. Thus, these localities obtained a natural advantage over others with respect to the availability of HYV. Laguna today is a show-window of short-stemmed varieties. There were also instances of private farmers obtaining new seeds for their own private testing. Although usually the seed was obtained through some institute program, there were also instances of new seed being disseminated through "informal methods," e.g., from samples taken by laborers on the experimental farm.

In July of 1966, IRRI sold 50 tons of IR8 seed to the Philippine government. This seed had been produced at the government's initiative, viz., the institute had been prodded to produce a large amount of seed in advance of the time it might have felt completely ready to introduce a new variety. The government took a chance that the best available variety at that time could make a significant breakthrough. It channeled 40 tons to selected private seed farms and the rest to test plots of the Bureau of Plant Industry and the

Commission on Agricultural Productivity. IR8 received official approval in April 1967, after three seasons of testing, and it was first planted on large scale in the wet season a few months later.[24/]

The government was at this time giving strong support to each rice program. A Rice and Corn Production Coordinating Council (RCPCC),[25/] was organized, headed by Rafael M. Salas. Agencies concerned with irrigation, research, extension, price support, credit, cooperatives, land reform and soils analysis were all represented in this body. In 1967/68, for instance, irrigation was provided to 106,000 hectares at a cost of over ₱17 million. Expenditures on research, extension, seed production, soil analysis, pest and disease control and program administration amounted to about ₱11 million; these were expenditures over and above those provided in the regular budgets of the agencies concerned.

Although the RCPCC was authorized to subsidize the sale of fertilizers and of seed, it purposely did not implement

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[24/] IR8 was given its name in November 1966. It was followed by IR5 in 1967, by IR20 and IR22 in 1969 and by IR24 in 1971. Today IR8 and IR5 have given way to IR20 and C4-63 (produced by the College of Agriculture of the University of the Philippines) inasmuch as these latter varieties are more disease resistant.

[25/] The Council's title was changed to National Food and Agriculture Council (NFAC) in 1969. Its original legal basis was R.A. No. 2084 of June 15, 1958, but active work began only in 1966. (See Victoria M. Arcega, "Mobilizing the Bureaucracy: The Case of the Rice and Corn Coordinating Council," Solidarity, 4:9, 1969, 9-25; Rice and Corn Production Coordinating Council Four-Year Rice and Corn Self-sufficiency Program, Quezon City, 1967; and Tomasa V. Mina and Fabian A. Tiongson, "Patterns of Rice Seed Distribution in the Philippines," in the Seminar Workshop on the Economics of Rice Production, University of the Philippines and International Rice Research Institute, 1967.)

this subsidy. This was, however, the period when Esso Fertilizer and Agricultural Chemicals Corporation[26], the largest Philippine manufacturer, had just been established and was implementing a broad marketing effort for its product.

Production and input prices were kept relatively favorable to the diffusion of the HYV. In 1966 the government support price for rice was raised by legislation from ₱12 ~~million~~ per 45 kg. to ₱16 per 46 kg. of ordinary varieties (including IR8) paddy. In 1967/68 the government purchased 400,000 metric tons of domestic paddy, or about 20% of the market surplus, at the cost of about ₱115 million, and stored much of it. The price of fertilizer on the other hand was relatively stable, with foreign competition representing an important force. In 1964-66, the rice-fertilizer price ratio was clearly rising steadily.[27]

More emphasis was laid on agricultural credit, mainly through funding the private rural banks and guaranteeing a major portion of rice production loans. The total value of institutional loans to support rice production was ₱189 million

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[26] Later purchased by the Sugar Producers Cooperative Marketing Association, and the name changed to Planters' Products.

[27] In earlier years, there had been a fertilizer subsidy of as much as 50% on fertilizer intended for rice, but without noticeable effect aside from numerous reports that the fertilizer was being diverted to sugar. This is now attributed to the low fertilizer-responsiveness of the best rice varieties formerly available. The pattern changed with the arrival of the HYVs, such that some imports, ostensibly for sugar, made by a large cooperative enjoying a tariff exemption privileges appeared to be rechanneled into rice.

in fiscal year 1965/66, ₱247 million in 1966/67, and ₱341 million in 1967/68. The average annual interest rate on such loans in Central Luzon during the 1967 wet season ranged from 10-12%, whereas loans from other sources carried rates ranging from 17-65%.[28/]

The government assistance program was not applied thinly over the entire country, but was concentrated first in the most favorable areas. The country was classified by the agricultural extension service into three priority areas, ranked in order of past productivity. For example, all of the important Central Luzon provinces were placed in Priority Area I. Within each province, barrios (villages) of greater potential productivity, indicated by the presence of irrigation and nearby warehouses, rural banks and agricultural suppliers were designated as "program barrios". Finally, certain farmers within program barrios termed "cooperators" were selected for intensive assistance. As will be described later, the highest rate of acceptance of the HYV were found to be among such program cooperators, particularly those with irrigated land.

The rapid acceptance by farmers of the HYVs has been phenomenal. Tables 1.2 to 1.11 contain area, production, and yield data for the Philippines and for the various regions. In the Philippines as a whole, the proportion of area planted

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28/ See Food and Agriculture Organization, "The Economic Impact of High Yielding Varieties in the Philippines," 1969, pages 60-61, 99.

to HYV rose from 21% in crop year 1967/68 to 56% in 1971/72. In the meantime, the total area harvested was declining slightly, so that increases in output were stemming almost entirely from increases in land productivity. As expected, the rates of acceptance were far higher on irrigated area, growing from 24% in 1967/68 to 73% in 1971/72.[29/] In terms of production, high-yielding varieties produced about one-fourth of the total in 1967/68, and by 1971/72 were producing 63% of the total. The yield advantage from HYVs, nationally speaking, has ranged from 30% to 35% of the yield of the traditional varieties.

Although there have been differences in the diffusion of HYVs among the various regions of the Philippines, no region has been substantially left out of the picture. At present, the region with the highest proportion of area in HYVs is Bicol. In 1971/72, 73% of the rice harvested in Bicol was under HYVs. In the Bicol irrigated rice area, the proportion had reached 86%. Bicol is followed by Central Luzon, the major rice growing area in the country. In Central Luzon the proportion of total area in HYVs was recently 62%, and the proportion of irrigated rice area in HYVs was 70%. Western Visayas and Northern and Eastern Mindanao come next on the scale. Southern Tagalog, in which Laguna province and IRRI are located, has 57% of its area in HYVs. (Much of Southern

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29/ Until the mid-sixties, Philippine rice data were not classified according to variety. The arrival of the HYVs and their large yield differentials over local varieties led to the incorporation of varietal classifications in government survey work.

Tagalog is hilly, and planted to fruit trees and coconuts. Laguna, in which the acceptance rate must be nearly 100%, is a relatively flat area in a crescent around the lake Laguna de Bay.) In Eastern Visayas and Southern and Western Mindanao the HYV hectarage ratio is about 50%. Two regions which are lagging somewhat behind the others are Ilocos with 47% and the Cagayan Valley with 41%. These are primarily tobacco-growing regions.

The diffusion patterns for the various regions are found in Figures 4 and 5. In most regions, one finds a resemblance to the first portion of the familiar S-shaped diffusion curve, indicating that the rate of acceptance is still on the upswing. This appears to be the case in Ilocos, Central Luzon, Southern Tagalog, Bicol, and Western Visayas. There is a trace of a tapering off of the rate of diffusion in Eastern Visayas and Northern and Eastern Mindanao, both of which are noted not as rice- but as corn-growing areas. In the Cagayan Valley and in Southern and Western Mindanao it would seem as though that a peak has been passed and that there has been a partial reversion to the traditional varieties, although the total proportion in HYVs remains high. It is too early to determine if this will be a permanent pattern. One notes that the Southern Tagalog, Bicol and Northern and Eastern Mindanao regions later recovered from dips in the proportion of area harvested in HYVs in crop year 1969/70.

Figure 5 shows the rate of diffusion of HYVs on irrigated area in each region. In Ilocos, the diffusion rate has been

very moderate, reaching only 50% by 1971/72. Ilocos is a rice deficit region, and its major product is tobacco. In the Cagayan Valley, the diffusion rate reached a peak of 60% by 1970/71. In Central Luzon, the diffusion rate is at 70% and still on the upswing. Progress has been even faster in the Southern Tagalog region, reaching over 90%, and promising to close in on complete acceptance. In the Bicol region, an exceptionally high plateau of nearly 85% was reached as early as 1968/69, and has been maintained up to the present. Eastern Visayas reached a somewhat lower plateau, just below 70%, also in 1968/69. The rate of acceptance in Western Visayas has grown less steeply but more steadily, from 25% in 1967/68 to almost 80% in 1971/72. The Mindanao provinces are noteworthy for having rice diffusion rates of about 50% on irrigated areas as early as 1967/68. From that point, the Northern and Eastern Mindanao rate has moved to about 77% recently. In Southern and Western Mindanao a rate of over 85% was maintained from 1968/69 to 1970/71; but there may have been a reversion of several percentage points in 1971/72.

The first major impact of the HYVs on production was felt in 1967/68. Total production of rice in that year was 103.7 million cavans (paddy), an increase of some 14% over the preceding year. This led to the exportation of some 40,000 metric tons of milled rice in calendar year 1968. The exportation was widely hailed as concrete evidence that

the Philippines had reached "self-sufficiency" at last. In 1968, the mean nominal retail price of rice in Manila was only 1.8% greater than in 1967, and the mean real retail price had declined by about 0.5%. In the next crop year, production fell somewhat, to only 101.0 million cavans, but this level was still over 10% greater than that of two years before. No steps were taken to import rice. The real price of rice was weakening, and there did seem to be a large stock of rice in the country. The following year, 1969/70, was definitely a bumper year. Production rose to an unprecedented 118.9 million cavans. In Manila, the nominal price in 1969 actually fell by 5.1%, whereas the real price fell by 6.1%. Although obviously no imports were needed, neither were exports authorized, possibly with the November 1969 presidential elections (which the administration won) in view. The year 1969 closed as a peak of exuberance with the high-yielding varieties of rice.

The growth in production attributable to HYV may be computed by comparing actual production with production under the supposition that the yield obtained on traditional varieties was obtained on the total rice hectarage. The proportion by which production is greater, on account of the HYV, then equals the proportion of total hectarage in HYV multiplied by the proportionate yield differential of HYV to other varieties. The results of this computation are found in Table 1.13. Thus, in 1967/68, we estimate that the HYV

brought about a production increase by 7.4%. In 1968/69, the HYV was responsible for a 13.4% increase. The growth-contribution of the HYV declined somewhat in the next two years, to between 10 and 11 per cent. While the proportion of land in HYVs continued to grow, the yield differential had declined from about 33% to between 20-25% only. However, the yield differential was restored to a high level the following year, 1971/72. This was actually a poor production year, with output falling to only 115.9 million cavans. Yet the presence of the HYVs enabled production to be nearly 20% greater than otherwise.

The record in the various regions varies considerably. Although the HYV almost invariably gave rise to greater production, it might be noted that in Western Visayas, in 1969/70 and 1970/71, the HYV yields actually fell just below the traditional varieties' yields, hence the computed negative contributions of HYV in the table. But clearly this was a rare exception. The region in which the HYV made the largest contribution has been Bicol. It is estimated that the HYV have caused production to be greater by as much as 76% (1968/69). In every crop year but one, the growth in output due to HYV is largest in Bicol than in any other region. It was the combined result of both the very fast rate of acceptance and a very high yield differential by the HYV over other varieties.

The region in which the next largest increases were attained has been Southern and Western Mindanao. Its acceptance rates and its yields differential have been slightly smaller than in Bicol. In Central Luzon, it may be noted that the increases attributable to HYV have been rather modest, ranging from only 4 to 12%. This is explained by the relatively high yields which had already been attained with traditional varieties in Central Luzon, which is the most commercialized rice producing region in the country. The yield differentials of the HYVs in Central Luzon have been only of the order of 15 to 30%. In the Bicol region, for comparison, the yield differential has ranged from nearly 50% to over 100%; but the yield base was of course much lower for the Bicol traditional varieties than for the Central Luzon traditonal varieties.

1.6 Difficult Years: 1970 to 1972

The decade of the 1960s closed very favorably in many respects, but the coming three years encountered many problems. In November 1969, the Nacionalista Party had won the national election, and Ferdinand Marcos was restored to the presidency for another term. The campaigns slogan was "Rice and Roads", reflecting the successes which had been achieved in the rice program, and the immense progress in the infrastructure program, particularly road and schoolhouse construction. The harvest in the wet season of 1969, at the close of the year, was a bumper one.

Obviously, no imports would be necessary for the forthcoming year, 1970.

The second term of President Marcos began without a honeymoon. Late in January, after the President delivered his State of Nation message at the opening of Congress, he was met by an unruly demonstration. This was followed by severe riots at the end of the month, at which several students were killed. Although, as in other nations of the world, the Philippines had seen demonstration with more and more frequency in the very late 'sixties, this was the first time one so violent had occurred. This was not a bright message for the forthcoming years.

Then, in February 1970, the Philippines was forced from balance of payments pressures to a de facto devaluation of the peso. The exchange rate moved immediately from ₱3.90 per U.S. dollar to over ₱5.00, and kept on growing to over ₱6.00 per U.S. dollar by the end of the year. This particular devaluation had been brought about by an external debt crisis. There had been little government management of the external debt, most of it in private hands, and short-term commitments had piled up to the extent that a devaluation was necessary. All throughout 1970, and into 1971, a heavy inflationary pressure was felt in the economy. One source of the pressure was the heavy increase in the money supply in 1969, generally associated with elections. But added to this were the price adjustments caused by the devaluation on

a highly import-dependent economy.[30] The rate of inflation was over 20% in 1970, and subsided only slightly to about 15% in 1971. Those whose incomes and assets were fixed in money terms were badly hurt. As a direct result, the legal minimum wage was increased in June 1970, from ₱6.00 to ₱8.00 per day for urban workers, and from ₱3.50 to ₱4.75 per day for farm enterprises. (However, the agricultural minimum did not apply to farm tenants, those in household service, or those working in registered cottage industries.) The increase in the price of rice in 1970, by about 19%, may be entirely attributed to the inflationary pressure of that year. It was not until 1971 that the real price of rice began to increase, indicating that the real supply problems in the rice industry had begun to be more serious than the inflationary or monetary problem.

Then, in November 1970, Luzon was struck by typhoon Yoling. It had the strongest wind velocity in the experience of the century, and the main wet season crop, in the midst of the harvest, was severely affected. Infrastructure was heavily damaged. Electrical power in Manila, cut off by the few hours' passage of the typhoon, took several weeks to restore.

In the meantime, less government attention was being given to the rice sector. In the first place, there was a

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[30] Cf. Gerardo P. Sicat, "Economic Policies and Philippine Development, U.P. Press, 1972.

loss of leadership when Rafael Salas resigned from the government just before the elections of 1969. The level of coordination exemplified by the former Rice and Corn Production Coordinating Council may have been difficult to match. The previous successes in the rice program may also have led to a feeling of complacency about rice. The RCPCC was converted to the National Food and Agriculture Council, thus spreading the concentration of the administrators to other food products too, particularly fish and vegetable production.

There was a slowdown in the flow of credit to the rice sector. Production loans for rice from commercial, rural and development banks were at their peak in 1967, amounting to about ₱651 million. However, there was a gradual decline during 1968 to 1970, and then only a small recovery in 1971, to the level of ₱605 million. The credit decline was mainly in the commercial banking sector, and there it was mainly in the Philippine National Bank. There was a drastic cut in Central Bank lending to the PNB for rice and corn purposes in 1970 and 1971. This was only a slightly offset by increased Central bank lending to rural banks for rice credit purposes.[31/] In addition, some banks were unable to make some requirements imposed for the privileges of the

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31/ The cut in Central Bank support of the PNB is said to have been made in conformity to exchange imposed by the International Monetary Fund. It was feared that such lending would be inflationary, in view of the outstanding account of the PNB with the Central Bank for rice and corn.

rediscount window. It is also claimed that land reform had impaired the credit standing of some landowners with banks.[32/]

On account of the peso devaluation, there were increases in prices of fertilizers and similar chemical inputs which farmers purchased. The cost of nitrogen (from ammonium and urea), the prime rice fertilizer, rose by about 40-50%. The amount of rough rice needed to purchase a kilogram of fertilizer rose from about two kilograms to over three kilograms.

The crops of both 1970 and 1971 were then hit by the tungro disease. The region which was the hardest hit was Central Luzon, such that production in crop year 1971/72 was nearly 30% below that of 1970/71. Fortunately production in almost all other regions grew substantially and the decline in national output in 1971/72 was only of the order of 4%. (The tungro disease is not thoroughly understood. In the opinion of Dr. Chandler: "tungro is not carried by the seed. Probably the outbreak of the disease of 1971 and 1972 was

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[32/] Central Bank Circular No. 306 of July 19, 1970 states that commercial banks have to meet the following requirements among others, in order to have access to Central Bank credit facilities. (1) The ratio of past-due direct and indirect loans to the bank's own stockholders, directors and officials to its aggregate past-due loans should not exceed 5%. (2) The bank should have a minimum paid-up capital of ₱20 million. Increases in paid-up capital above the minimum entitle the bank to proportionate increases in its basic rediscounting ceiling. (3) The bank's capital account, as adjusted to cover any valuation reserves recommended by the Central Bank to cover doubtful and loss accounts, should meet the minimum capital required under Section 22 of R.A. 337 (15% of total assets less cash on hand, amounts due from banks, and government indebtedness held). (4) The bank should not have expanded its portfolio through rediscounting for purposes

due to the great increase of the greenleafhopper. ...it seems to come and grow and it apparently related to the ecological factors affecting the greenleafhopper. This of course, has yet to be proved conclusively."[33/])

The political dissension continued. In the cities, radical groups began to grow in strength. Demonstrations became more and more frequent, and graffiti appeared ubiquitously in Manila. In the rural areas, rebellion was being cultivated more intensely. In Luzon and Visayas, one of the most active forces was the Maoist-oriented communist group. In Mindanao, the Muslim seccesionist movement was growing in strength, and armed conflicts were becoming more and more common, particularly in the provinces of Cotabato and Lanao. The unrest of the youth continued throughout 1971. In February, the University of the Philippines in Diliman was taken over by radical groups for several days. Demonstrations became confrontations between youth and the police; violence and death came to be expected, a notable instance being Labor Day of 1971.

A peak in urban violence was reached in August 1971, when two handgrenades were thrown at a political meeting of

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other than to finance desired economic activities, such as food production and export-oriented industries. (5) The bank's foreign exchange holdings in excess of 30% of outstanding letters of credit should be disposed of in the interbank market.

[33/] Letter of Dr. Robert F. Chandler (the International Rice Research Institute) to Dr. Gerardo P. Sicat (National

the campaigning opposition Liberal Party at Plaza Miranda. Several persons were killed, and the candidates themselves suffered extremely serious though not fatal injuries. (The November election turned out as a victory for the opposition.) The next day the President suspended the privilege of the writ of habeas corpus.

Thus the mood of the country during the campaign of 1971 was extremely tense. Whereas there had been no rice imports in the preceding three years, in 1971 the government imported 459,000 metric tons, using the tungro problem as the justification. As the campaign progressed, large shipments of imported rice arrived, of which a little over half was distributed in Greater Manila. The intent was admittedly to combat high rice prices in Manila in the context of an urban panic.[34/] Whereas Greater Manila consumes roughly 30,000 metric tons of rice per month, it has been estimated that the Rice and Corn Administration distributed to the metropolis about 12,000 tons in September, 33,000 in October and 30,000 in the first half of November of 1971. Although the government was supplying all of the city's consumption in October, and double the consumption requirement in the first half of November, the price of rice in the city continued

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Economic Council), December 27, 1971. This opinion is consistent with the fact that serious outbreaks of the tungro disease have appeared in the Philippines only about two or three times in the twentieth century. In any case, the disease began to abate by the time of the wet season of 1972.

34/ J.D. Drilon, Jr., The RCA in the Last Eight Months (Terminal Report), Rice and Corn Administration, December 6, 1971, mimeo.

to rise in both real and nominal terms in October, and only slightly declined in November. The most probable explanation is that there was considerable adding of the government rice to the stocks of both rice traders and of ordinary households. Given the urban tension, urban households probably had very strong motivation to build up their personal stock of rice. The year 1971 was uncharacteristic among Philippine rice crises in that, in addition to problems of inflation and of production there appeared to have been also an extraordinary increase in the stock demand for rice as well.

Incredibly enough, however, the disasters afflicting rice did not abate. In July-August 1972, mid-way in the growing season, Luzon experienced heavy rains causing the worst floods of the twentieth century. (In the meantime, the southern half of the archipelago was being affected by the same drought striking Indonesia at the time. The drought was not ended until April 1973.) In Central Luzon 282,000 hectares were damaged, of which 183,000 were in rice. In Southern Tagalog, 11,000 hectares, all of them in rice, were damaged. The estimated value of agricultural damages and production losses was as follows: in Central Luzon, ₱212 million, of which damage in rice areas was placed at ₱103 million; in Southern Tagalog, ₱12 million, of which ₱11 million was on rice; and in the Bicol region, ₱3 million worth of damage, entirely on coconuts. The total flood damage in Central Luzon and in Greater Manila was estimated

to be ₱1.15 billion. Of this amount, roads and bridges came to ₱971 million; damage to irrigation was ₱137 million; and damage to flood control infrastructure was ₱237 million. The economic planners subsequently revised downwards the fiscal year 1973 target growth rate for agriculture from 5.8% to 1.7% per annum.

The great flood was but an interruption to the political and increasingly violent strife between and among administration party and opposition, conservatives and leftists, Muslims and Christians. On September 23, 1972, the President announced that he had declared martial law two days previous.

1.7 Turning Point?

Many leftover problems remain. There has been a tremendous amount of reconstruction done on irrigation works and other infrastructure damaged in the last flood, yet the rebuilding is still incomplete. In Mindanao, the largest rice-growing province, Cotabato, is in a state of conflict, and the fate of rice production is uncertain to say the least. There is now a net shipment of rice into the province rather than out of it.

Nevertheless, there are some hopeful elements to the supply situation. A mere seven years after the introduction of the HYVs, more than half of Philippine rice hectarage is now planted to them. In Central Luzon in particular, the tungro disease has abated. (The ecological theory behind

its cyclical appearance may be correct.) Farmers are noticeably shifting to tungro-resistant HYVs (IR20, C4-63, C4-137) from the tungro-susceptible varieties (IR8, IRS, IR22, wagwag, and some other Philippine Seedboard varieties); there is no trend towards tungro-resistant traditional varieties.

Irrigation construction continues to progress. The proportion of rice crop area irrigated rose from an average of 31% in 1963/65 to an average of 42% in 1968/70. With the completion of the Upper Pampanga River Project by 1975, it has been estimated that the growth in irrigated crop area will exceed 5% per annum.[35/] Better irrigation will both raise the yields of any variety and further the adoption of the HYVs.

The absorption of fertilizer in the Philippines is still very far below the maximum. The Philippines consumes about 18 kg. of nutrients per hectare of agricultural land, compared to 302 kg. in Taiwan, and 400 kg. in Japan. In the case of rice in particular, it was estimated that only one-fourth of the total Philippine rice hectarage in 1968/69 was fertilized at all. In addition, the nitrogen application rate on the fertilized portion was at most about one-fourth of the recommended rate.[36/] Fertilizer consumption data on

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[35/] M. Mangahas, William H. Meyers and Randolph Barker, Labor Absorption in Philippine Agriculture, Paris: Organization for Economic Cooperation and Development, 1972, p.25.

[36/] J.T. Shields and R.C. Gray, The Fertilizer Industry in the Philippines, Tennessee Valley Authority, 1971, pp. 31, 33, 46.

rice is not available for later years, but it might be surmised that the fertilizer price increases after the 1970 devaluation were very discouraging to the spread of the use of this input.

Government attention to the rice program has been renewed. A new fertilizer subsidy is presently being worked out, under the "socialized pricing" effort, by which prices of ammonium sulfate and urea may decline by 11-15%. The support price for rice, earlier badly eroded by the inflation of the early seventies, was recently set at ₱30 per 50 kg. of paddy. A new credit scheme is being tried, by which several farmers in a contiguous area are granted a joint loan under their joint responsibility (the selda/damayan system); it is too soon to speculate, however, on the success of this innovation.

Actually, the major government attention to agriculture since September 1972 has been directed not to productivity but to equity. In October, Presidential Decree No. 27 declared that tenants are automatically owners, and should pay former owners in installments in kind equivalent to the legal leasehold rental prior to the decree.[37/] The relationship between HYVs and land reform has however been neutral

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37/ The land sales price in real units of the product and the interest rate on outstanding principal were chosen so that installments would fully pay for the land after 15 years. Transfer of the acquired land is prohibited except for hereditary succession.

Table 1.1 Net Milled Rice Imports of the Philippines
(Thousand metric tons)

Calendar Year	Net Imports or (Exports)
1950	(4.7)
1951	109.1
1952	62.9
1953	(1.2)
1954	42.6
1955	63.5
1956	42.4
1957	77.9
1958	230.6
1959	6.5
1960	(1.6)
1961	196.3
1962	-
1963	256.2
1964	299.9
1965	569.2
1966	108.2
1967	238.6
1968	(40.3)
1969	(.5)
1970	-
1971	459.5
1972	425.5

Sources:

1955-1963 as revised and adopted by an Inter-Agency Committee of the government on March 31, 1965;

1964-1967 from Rice and Corn Administration plus additional imports as reported by the Bureau of Census and Statistics;

1968-1969 from the Bureau of Census and Statistics;

1970-1972 from the Rice and Corn Administration.

\- less than 100 metric tons

TABLE 1.2 Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay - Philippines

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
EA (thousand hectares)					
Total area harvested - all palay	3,304	3,332	3,113	3,112	3,246
% of total area for HYV	21.2	40.6	43.5	50.3	56.3
Total area irrigated	1,309	1,483	1,346	1,471	1,332
% of irrigated area to total	39.6	44.5	43.2	47.3	41.0
% of irrigated area for HYV	34.0	61.6	61.4	67.0	73.4
ODUCTION (thousand cavans)					
Total production of all palay	103,700	101,000	118,900	121,400	115,900
HYV	27,550	48,130	58,330	66,600	73,460
% of HYV to total production	26.6	40.5	49.1	54.8	63.4
ELD PER HECTARE (cavans/ ha.)					
All Palay	31.4	30.3	38.2	39.0	35.7
HYV	39.3	35.6	43.1	42.5	40.2
Other varieties	29.2	26.7	34.5	35.4	29.9
Proportion of HYV to OV	1.35	1.33	1.25	1.20	1.34

urce: Bureau of Agricultural Economics

[a/] Preliminary Estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

te: 1 cavan = 44 kg.
palay = rough rice (paddy)

ABLE 1.3 Region I - Ilocos: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
EA (thousand hectares)					
Total area harvested all palay	140.9	129.2	144.8	127.4	145.6
% of area for HYV	29.8	30.0	29.4	37.8	47.4
Total area irrigated	75.8	57.7	76.5	82.4	82.7
% of irrigated to total area	53.8	44.6	52.8	64.7	56.8
% of irrigated area for HYV	36.5	41.1	34.6	42.0	51.1
ODUCTION (thousand cavans)					
Total production all palay	5,715	5,750	5,217	4,572	5,381
Total production of HYV	2,408	2,063	1,938	2,322	3,240
% of HYV to total production	42.13	35.87	37.14	50.78	60.21
ELD PER HECTARE (cavans/ ha.)					
All palay	40.5	44.5	36.0	35.9	37.0
HYV	57.3	53.3	45.4	48.3	47.0
Other varieties	33.4	40.7	32.1	28.4	28.0
Proportion of HYV to other varieties	1.716	1.310	1.414	1.701	1.68

urce: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

te: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

TABLE 1.4—Region II - Cagayan Valley: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
AREA (thousand ha.)					
Total area harvested all palay	296.8	272.0	314.0	361.2	383.9
% of area for HYV	9.93	35.0	39.1	47.1	41.6
Total area irrigated	130.9	128.2	211.9	212.6	198.6
% of irrigated to total area	44.1	47.1	67.5	58.8	51.73
% of irrigated area for HYV	20.3	40.1	52.4	67.9	64.8
PRODUCTION (thousand cavans)					
Total production all palay	10,930	8,112	11,670	15,920	15,410
Total production of HYV	1,538	3,542	5,186	8,022	7,169
% of HYV to total production	14.1	43.7	44.1	50.4	46.5
YIELD PER HECTARE (cavans/ hectare)					
All palay	36.8	29.8	37.2	44.1	40.1
HYV	52.2	37.1	42.2	47.2	44.8
Other varieties	35.1	25.9	33.9	41.3	36.8
Proportion of HYV to other varieties	1.49	1.43	1.24	1.14	1.22

Source: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

Note: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

BLE 1.5 Region III - Central Luzon: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
EA (thousand ha.)					
Total area harvested all palay	628.0	608.8	634.8	641.5	671.1
% of area for HYV	16.9	37.0	36.8	45.6	62.0
Total area irrigated	360.3	371.6	327.3	354.3	289.3
% of irrigated to total area	57.4	61.0	51.6	55.2	43.1
% of irrigated area for HYV	26.0	46.4	46.0	53.4	70.4
ODUCTION (thousand cavans)					
Total production all palay	26,370	25,670	32,100	33,290	24,470
Production of HYV	5,275	11,200	12,910	16,490	15,960
% of HYV to total production	20.0	43.6	40.2	49.5	65.2
ELD PER HECTARE (cavans/ha.)					
All palay	42.0	42.2	50.5	51.9	36.5
HYV	49.6	49.7	55.4	56.3	38.3
Other varieties	40.4	37.7	47.8	48.2	33.4
Proportion of HYV to other varieties	1.23	1.32	1.16	1.17	1.15

ource: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

te: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

LE 1.6 Region IV - Southern Tagalog: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
A (thousand ha.)					
Total area harvested all palay	529.7	538.1	345.4	387.0	408.8
% of area for HYV	25.1	47.8	43.1	51.1	57.2
Total area irrigated	238.5	276.4	153.5	180.9	175.1
% of irrigated to total area	45.0	51.4	44.4	46.7	42.8
% of irrigated area for HYV	39.0	65.7	67.5	68.2	83.8
DUCTION (thousand cavans)					
Total production all palay	15,230	14,100	13,980	14,570	13,210
Production of HYV	4,729	6,636	6,866	7,770	8,624
% of HYV to total production	31.1	47.1	49.1	53.3	65.3
LD PER HECTARE (cavans/ha.)					
All palay	28.8	26.2	40.5	37.7	32.3
HYV	35.6	26.3	46.1	39.3	36.9
Other varieties	26.5	26.1	36.2	36.0	26.2
Proportion of HYV to other varieties	1.34	1.01	1.27	1.09	1.41

rce: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

e: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

ABLE 1.7 Region V - Bicol: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
REA (thousand ha.)					
Total area harvested all palay	314.6	300.3	358.0	298.5	273.6
% of area for HYV	27.3	64.3	57.7	63.5	73.4
Total area irrigated	134.6	174.0	164.0	154.8	137.4
% of irrigated to total area	42.8	58.0	45.8	51.8	50.2
% of irrigated area for HYV	36.1	84.8	82.4	84.5	86.0
ODUCTION (thousand cavans)					
Total production all palay	9,861	10,220	12,620	8,587	12,390
Total production of HYV	3,836	8,152	9,188	6,444	9,941
% of HYV to total production	38.9	79.8	72.8	75.0	80.2
ELD PER HECTARE (cavans/ha.)					
All palay	31.3	34.0	35.3	28.8	45.3
HYV	44.7	42.2	44.5	34.0	49.5
Other varieties	26.3	19.3	22.7	19.7	33.7
Proportion of HYV to other varieties	1.70	2.19	1.96	1.73	1.47

urce: Bureau of Agricultural Economics

a/ Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

e: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

BLE 1.8 Region VI - Eastern Visayas: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
EA (thousand ha.)					
Total area harvested all palay	350.0	382.9	256.6	253.0	270.7
% of area for HYV	19.2	29.8	44.4	49.5	50.0
Total area irrigated	101.8	105.3	64.0	74.6	73.7
% of irrigated to total area	29.1	27.5	24.9	29.5	27.2
% of irrigated area for HYV	35.8	70.8	67.3	68.6	69.5
ODUCTION (thousand cavans)					
Total production all palay	6,756	7,543	6,358	7,596	7,299
Production of HYV	1,714	2,692	3,153	4,767	4,018
% of HYV to total production	25.4	35.7	49.6	62.8	55.0
ELD PER HECTARE (cavans/ha.)					
All palay	19.3	19.7	24.8	30.0	27.0
HYV	25.5	23.6	27.7	38.1	29.7
Other varieties	17.8	18.0	22.5	22.2	24.2
Proportion of HYV to other varieties	1.43	1.31	1.23	1.72	1.23

ource: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

ote: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

ABLE 1.9 Region VII - Western Visayas: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
REA (thousand ha.)					
Total area harvested all palay	376.2	384.9	397.8	420.6	425.0
% of area for HYV	14.2	30.9	40.7	43.6	60.6
Total area irrigated	80.7	105.2	72.4	135.1	100.0
% of irrigated to total area	21.4	27.3	18.2	32.1	23.5
% of irrigated area for HYV	25.4	46.6	51.1	65.0	79.0
RODUCTION (thousand cavans)					
All palay	12,530	11,480	13,660	15,040	13,630
HYV	1,964	4,296	5,557	6,536	9,170
% of HYV to total production	15.7	37.4	40.7	43.4	67.3
IELD PER HECTARE (cavans/ha.)					
All palay	33.3	29.8	34.3	35.8	32.1
HYV	36.7	36.1	34.3	35.7	35.6
Other varieties	32.7	27.0	34.4	35.8	26.7
Proportion of HYV to other varieties	1.12	1.34	.997	.997	1.33

ource: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

te: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

1.10 Region VIII - North & East Mindanao: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
(thousand hectares)					
otal area harvested all palay	207.6	248.6	194.3	213.0	229.9
of area for HYV	14.1	29.9	28.1	51.7	59.3
otal area irrigated	41.1	86.5	56.1	101.8	95.6
of irrigated to total area	19.8	34.8	28.9	47.8	41.6
of irrigated area for HYV	52.3	65.5	53.8	71.8	77.6
TION (thousand cavans)					
otal production all palay	4,222	5,629	6,345	7,742	7,641
oduction of HYV	682.9	2,171	2,056	4,134	5,054
of HYV to total production	16.2	38.6	32.4	53.4	66.1
PER HECTARE avans/ha.)					
l palay	20.3	22.6	32.6	36.4	33.2
V	23.4	29.2	37.6	37.5	37.1
her varieties	19.8	19.8	30.7	35.1	27.7
oportion of HYV to other varieties	1.18	1.47	1.22	1.07	1.34

: Bureau of Agricultural Economics

/Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

BLE 1.11 Region IX - South & West Mindanao: Area, production and yield per hectare of High-Yielding Varieties (HYV) of Palay

	1967/68	1968/69	1969/70	1970/71[a/]	1971/72
EA (thousand hectares)					
Total area harvested all palay	460.0	467.2	467.8	410.6	437.9
% of area for HYV	33.7	51.1	57.5	60.5	49.6
Total area irrigated	145.3	177.8	220.1	174.0	179.5
% of irrigated to total area	31.6	38.0	47.0	42.4	40.9
% of irrigated area for HYV	53.1	87.6	86.1	86.6	74.2
ODUCTION (thousand cavans)					
Total production all palay	12,041	12,520	17,010	14,100	16,480
Production of HYV	5,404	7,375	11,470	10,110	10,280
% of HYV to total production	44.9	58.9	67.4	71.7	62.4
ELD PER HECTARE (cavans/ha.)					
All palay	26.2	26.8	36.4	34.4	37.6
HYV	34.8	30.9	42.6	40.7	47.4
Other varieties	21.8	22.5	27.9	24.6	28.1
Proportion of HYV to other varieties	1.60	1.37	1.53	1.65	1.69

rce: Bureau of Agricultural Economics

[a/] Preliminary estimates based on a subsample of 2/3 of the number of sample barrios of the Final IAS Round. Final estimates shall be based on the returns for the whole IAS sample from the Census of Agriculture of the Bureau of Census and Statistics.

e: 1 cavan = 44 kg.
palay = rough rice (paddy)
(regions are based on the "old" classification which has nine regions)

TABLE 1.12 Palay (rough rice): Forecast of production, harvest area and Yield per hectare, by region, Philippines, 1972/73 as of January 1, 1973[a/]

REGION	CROP HARVEST AREA (thousand hectares)	PROBABLE PRODUCTION (thousand cavans)	YIELD (cavans/ha.)
Philippines	3,229	113,000	33.9
cos	161	5,270	32.7
ayan Valley	371	14,720	39.7
tral Luzon	638	23,800	37.3
thern Tagalog	456	15,090	33.1
ol	354	12,960	36.6
tern Visayas	414	13,540	32.7
tral Visayas	99	2,830	28.6
tern Visayas	176	4,980	28.3
tern Mindanao	131	3,780	28.8
thern Mindanao	225	5,910	26.3
thern Mindanao	304	10,080	33.1

urce: Bureau of Agricultural Economi-

a/ — Based on the 1972 Government Reorganization Plan. Please see Appendix A.

Agricultural Experiment Stations.

TABLE 1.13 Increases in Production Attributable to HYV, by Region, 1967/68-1971/72[a]

Region	In Percentages				
	1967/68	1968/69	1969/70	1970/71	1971/72
Philippines	7.42	13.40	10.88	10.06	19.42
Ilocos	21.34	9.30	12.17	26.50	32.23
Cagayan Valley	4.87	15.05	9.38	6.59	9.15
Central Luzon	3.89	11.84	5.89	7.75	9.30
Southern Tagalog	8.53	0.47	11.64	4.60	23.45
Bicol	19.11	76.52	55.39	46.36	34.50
Eastern Visayas	8.26	9.24	10.21	35.64	11.50
Western Visayas	1.70	10.51	-0.12	-0.13	20.00
Northern & Eastern Mindanao	2.54	14.05	6.18	3.62	20.16
Southern & Western Mindanao	20.22	18.91	30.48	39.33	34.22

[a] Computed as the proportion of area in HYV multiplied by the proportionate yield differential of HYV to other varieties.

TABLE 1.14 Monthly Average Retail Price of Rice (ordinario) in Manila (₱/ganta)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
.78	.80	.84	.89	.90	.91	.94	.94	.95	.95	.95	.93
.86	.80	.85	.85	.85	.85	.85	.85	.85	.85	.85	.84
.85	.86	.88	.88	.89	.92	.97	1.01	1.10	1.13	1.07	1.01
1.14	1.10	1.16	1.05	1.12	1.18	1.15	1.08	1.07	1.05	.95	.95
.91	.90	.86	.85	.85	.82	.78	.78	.78	.83	.83	.75
.75	.75	.75	.75	.75	.78	.79	.84	1.05	1.15	1.15	.99
.99	.99	.99	1.00	1.15	1.15	1.15	1.15	1.19	1.10[a]	1.05[a]	1.00
.95	.95	.95	.96	1.00	1.00	1.00	1.05	1.05	1.05	1.05	1.00
1.02	1.05	1.05	1.10	1.15	1.15	1.15	1.18	1.30	1.30	1.20[a]	1.
1.20	1.31	1.35	1.35	1.42	1.46	1.57	1.55	1.50	1.36	1.35	1.3
1.35	1.35	1.35	1.35	1.32	1.36	1.35	1.40	1.40	1.40	1.40	1.4
1.37	1.33	1.30	1.38	1.40	1.45	1.52	1.69	1.83	1.89	1.85	1.6
1.59	1.65	1.70	1.70	1.70	1.70	1.75	1.80	1.79	1.71	1.72	1.7
1.75	1.72	1.70	1.70	1.65[a]	1.65[a]	1.65[a]	1.65[a]	1.65[a]	1.65[a]	1.45	1.4
1.45	1.45	1.40	1.40	1.40	1.40	1.46[b]	1.51	1.65	1.57	1.75	1.7
1.70[b]	1.65[b]	1.65	1.65	1.65	1.69	1.75	1.85	1.85	1.90[a]	1.95[a]	1.8
1.95	2.05	2.20	2.27	2.33	2.40	2.60	2.60	2.75	2.75	2.80	2.7
2.70	2.65	2.65	2.70	2.70	2.65	2.68	2.74	2.70	2.65	2.55	2.5

[a] Macan 2nd class

[b] Estimate

ce: Bureau of Commerce

Malaybalay Experiment Station.

TABLE 1.15 Monthly Average Retail Price of Rice (Ordinario) in Manila Deflated by the Manila Consumer Price Index for all Items (₱/ganta)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
			.70	.69	.70	.70	.73	.91	.99	.99	.87
.88	.89	.89	.90	1.04	1.03	1.01	1.00	1.02	.95	.91	.87
.82	.81	.81	.82	.85	.85	.84	.85	.85	.85	.85	.81
.83	.86	.86	.90	.94	.92	.91	.93	1.00	.98	.91	.87
.90	.98	1.01	1.02	1.07	1.09	1.12	1.10	1.08	.97	.96	.93
.95	.96	.97	.99	.97	.98	.97	.99	.98	.99	.99	1.01
.94	.92	.91	.96	.96	.96	1.02	1.13	1.18	1.22	1.20	1.0[illegible]
1.01	1.04	1.11	1.14	1.13	1.11	1.12	1.14	1.12	1.05	1.03	1.0[illegible]
1.10	1.10	1.10	1.10	1.06	1.05	1.05	1.04	1.02	1.02	.90	.91
.92	.94	.90	.90	.90	.89	.91	.92	1.00	1.01	1.06	1.03
1.00	.97	.94	.91	.90	.91	.92	.96	.95	.95	.94	.92
.92	.97	1.05	1.08	1.10	1.11	1.19	1.17	1.23	1.21	1.24	1.22
1.16	1.14	1.14	1.17	1.17	1.13	1.11	1.10	1.09	1.10	1.07	1.06

TABLE 1.16 Average Prices Received by Farmers in the Philippines, by Regions, for Palay Ordinario, (Macan 2nd Class) 1957-1972 (₱/cavan of 44 kilos)

Philippines	Regions I	II	III	IV	V	VI	VII	VIII	IX
9.67	9.54	9.23	10.16	9.74	8.78	9.91	9.84	9.78	9.03
10.01	9.78	10.25	10.77	10.40	9.59	10.27	9.96	10.11	8.89
7.91	9.04	7.09	8.51	7.87	7.29	8.31	7.72	7.87	6.66
8.60	9.09	7.77	9.38	8.86	8.37	8.99	8.40	8.30	8.39
10.18	10.81	10.00	11.12	10.67	9.29	10.21	10.44	9.79	9.30
9.65	9.49	8.80	10.45	9.15	9.85	9.82	9.87	9.27	9.38
11.80	10.53	10.51	12.43	12.58	11.04	12.16	12.41	11.65	11.24
13.66	12.07	12.19	15.32	14.77	12.12	13.11	14.44	13.09	12.37
14.91	17.37	14.19	15.56	14.99	13.78	14.28	15.86	14.90	13.75
16.52	18.15	14.37	18.62	16.46	16.16	15.64	16.09	16.03	15.36
16.72	20.92	15.41	18.88	17.02	16.01	17.21	16.22	14.49	16.27
15.55	17.74	13.86	17.17	16.87	14.16	15.89	14.41	15.22	14.83
15.88	17.65	15.68	17.53	17.33	15.15	16.13	16.04	14.32	13.02
17.50	15.83	16.98	19.52	18.80	16.81	17.12	16.73	18.28	16.35
24.39	24.10	24.76	26.71	20.15	21.90	23.54	24.17	24.32	21.93
28.30	29.18	28.21	30.71	30.11	25.60	26.52	27.97	27.02	24.97

a/ Macan 1st class, unweighted.

e: Bureau of Agricultural Economics

Table 1.17 Average Retail Price from Private Dealers of Fertilizers, Luzon, 1965 - 72
(pesos/bag)

	Ammonium Sulfate 21-0-0 [a/]	Urea 45-0-0 [b/]
1965	13.25	
1966	13.00	
1967	14.75	
1968	13.50	22.50
1969	14.25	23.50
1970	18.25	28.75
1971	19.50	31.00
1972	16.60 [c/]	27.49 [c/]

a/ in 45 kg. bag

b/ in 50 kg. bag

c/ average of retail prices of fertilizers of Planters Products in Bataan, Bulacan, Laguna, Nueva Ecija, Pampanga, Pangasinan, Rizal, Tarlac, and Zambales. The prices are based on the "socialized" pricing in accordance with an earlier agreement between Planters and the government.

Sources: 1965-71 John T. Shields and Robert C. Gray, The Fertilizer Industry in the Philippines, Tennessee Valley Authority (NEC-USAID Fertilizer Consultants) and The Technical Working Committee Presidential Fertilizer Commission, 1971.

1972 National Food and Agriculture Council.

Table 1.18 Wage Rates in Terms of Rice and in Terms of Consumer Goods in General, 1966/67-1970/71

Fiscal Year	Index of wage rate deflated by the price of rice (1955=100)	Index of wage rates deflated by the consumer price index (1955=100)
1966/67	144	94
1967/68	145	91
1968/69	159	100
1969/70	164	96
1970/71	190	93

Source: Computations of R. Barker, International Rice Research Institute, January 1972.

TABLE 1.19 Loans Granted to the Rice Industry 1961-1971
(In million pesos)

	All banks		Commercial banks			
	All loans	Production loans	All loans	Production loans	Rural banks	Development banks[a/]
1961	224.5	224.5	171.9	171.9	49.8	2.8
1962	281.5	281.5	197.8	197.8	68.2	15.5
1963	363.7	363.7	227.8	227.8	120.8	15.1
1964	440.2	440.2	237.2	237.2	183.4	19.6
1965	341.1	341.1	245.2	245.2	80.4	15.5
1966	402.7	402.7	281.9	281.9	92.1	28.7
1967	651.1	651.1	390.4	390.4	219.9	40.8
1968	870.3	556.1	654.1	339.9	180.6	35.6
1969	820.6	536.9	606.2	339.9	188.7	25.7
1970	850.0	576.0	617.2	343.2	213.0	19.8
1971[b/]	705.5	605.5	445.2	345.2	240.5	19.8

Source: Table I of "Rice Financing through Banks in the Past Ten Years," prepared by Central Bank representatives, Annex 17 to the Report of the Inter-Agency Technical Committee on Rice and Corn Policy to the Chairman of the National Economic Council, January 6, 1972.

[a/] All loans = production loans during 1961-1971.

[b/] Estimates.

TABLE 1.20 Central Bank Loans to Commercial and Rural Banks for Rice and Corn, 1965-1971
(in million pesos)

	Loans to commercial banks for rice and corn		Loans to rural banks for rice	Central Bank rediscount rate (in %)	
	Total	PNB		Rice & Corn	Basic
1965	271.6	271.6	n.a.	3	6
1966	74.2	60.1	41.1	3	4.75
1967	370.3	342.4	45.5	3	6
1968	1079.9	866.4	46.1	4	7.50
1969	1013.5	916.5	63.6	6	8-10
1970	122.2	100.1	81.4	6	8-10
1971	5.4[a/b/]	5.4[a/b/]	85.7[c/]	6	8-10

ources: Tables III and IV of "Rice Financing through Banks in the Past Ten Years," prepared by Central Bank representatives, Annex 17 to the Report of the Inter-Agency Technical Committee on Rice and Corn Policy to the Chairman of the National Economic Council, January 6, 1972.

a/ Rice only.

b/ Emergency advances under Section 90 of R.A. 265. January to December 16 only.

c/ January to November only.

Maligaya Experiment Stations.

Table 1.21 CB Loans Outstanding to Commercial Bank for Rice and Corn, 1965-1971

(In Million Pesos)

	All commercial banks	PNB
1965	151.7	141.4
1966	179.6	168.8
1967	348.8	331.2
1968	514.6	443.8
1969	633.2	606.8
1970	343.9	343.9
1971(Dec.20)	302.4	302.4

SOURCE: Table V of "Rice Financing through Banks in the Past Ten Years," prepared by Central Bank representatives, Annex 17 to the Report of the Inter-agency Technical Committee on Rice and Corn Policy to the Chairman of the National Economic Council, January 6, 1972.

Table 1.22 Philippine Rice Yields and Irrigation Rates, 1968/70

(Three-Year Averages)

Period	Yields in MT palay per ha.	Percent of crop area irrigated
1948/50	1.15	19
1951/53	1.17	n.a.
1954/56	1.20	22
1957/59	1.11	24
1960/62	1.17	28
1963/65	1.25	31
1966/68	1.34	38
1968/70	1.46	42

[a]Irrigated area available only for 1948, 1956, 1959 and yearly thereafter.

SOURCE: Randolph Barker, William H. Meyers, Cristina Crisostomo and Bart Duff, "Employment and Technological Change in Philippine Agriculture," Paper prepared for the UN. International Labor Office, October 1971, Table 2; basic data from the Bureau of Agricultural Economics.

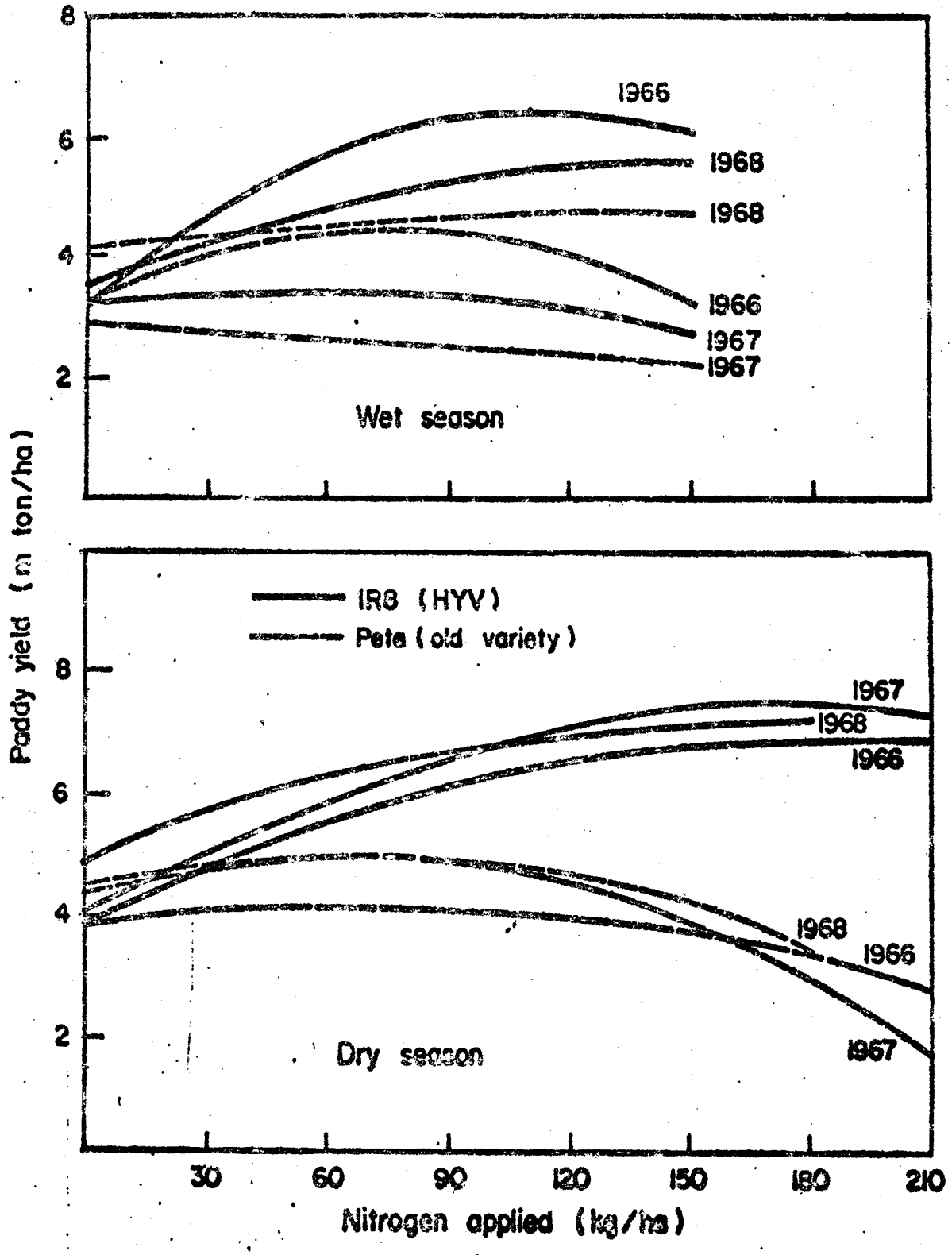

Fig. 1.--Nitrogen Response Functions for Rice at Maligaya Experiment Station.

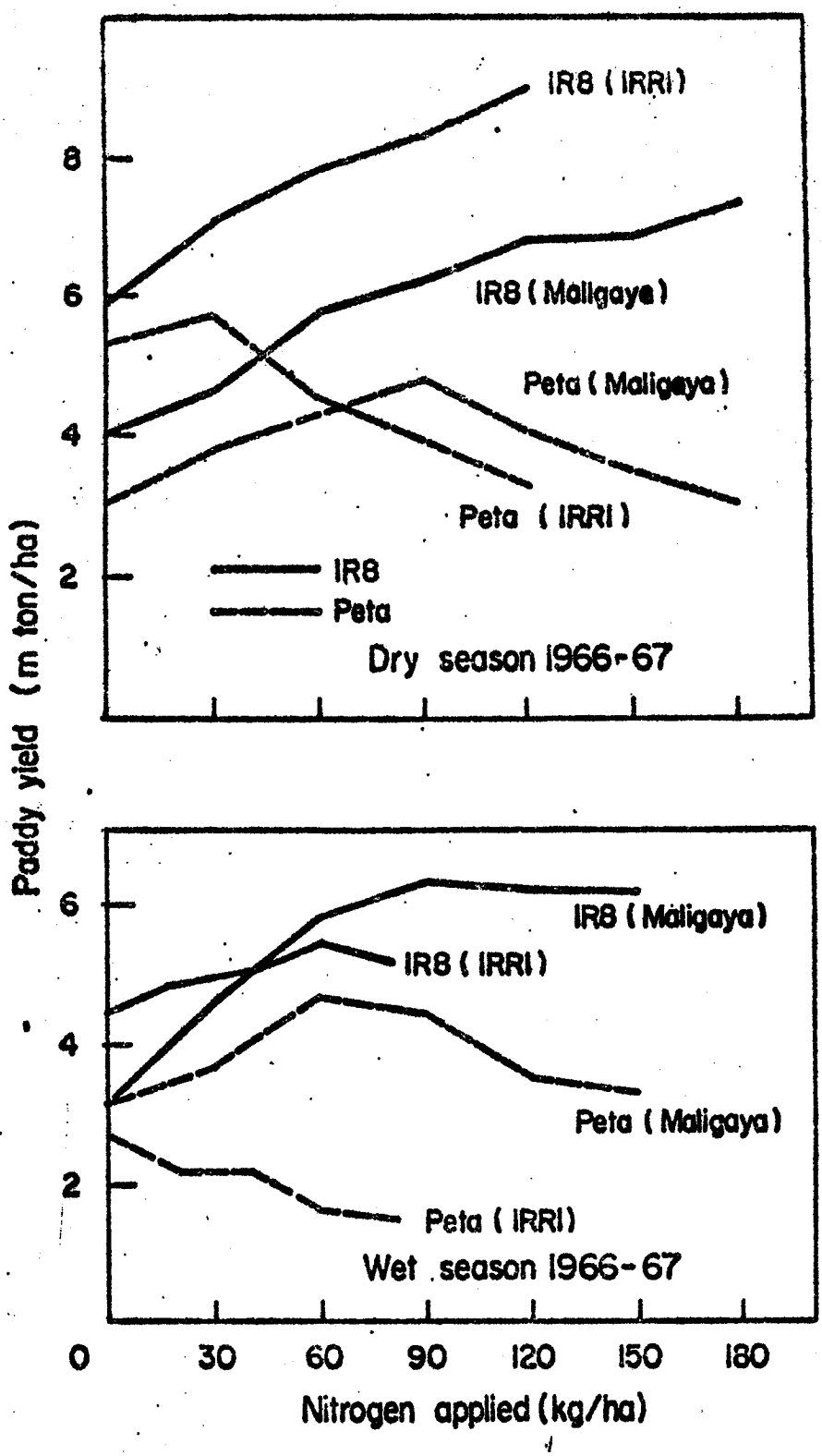

Fig. 2.--Nitrogen Response Functions for Rice at IRRI and Maligaya Experiment Stations.

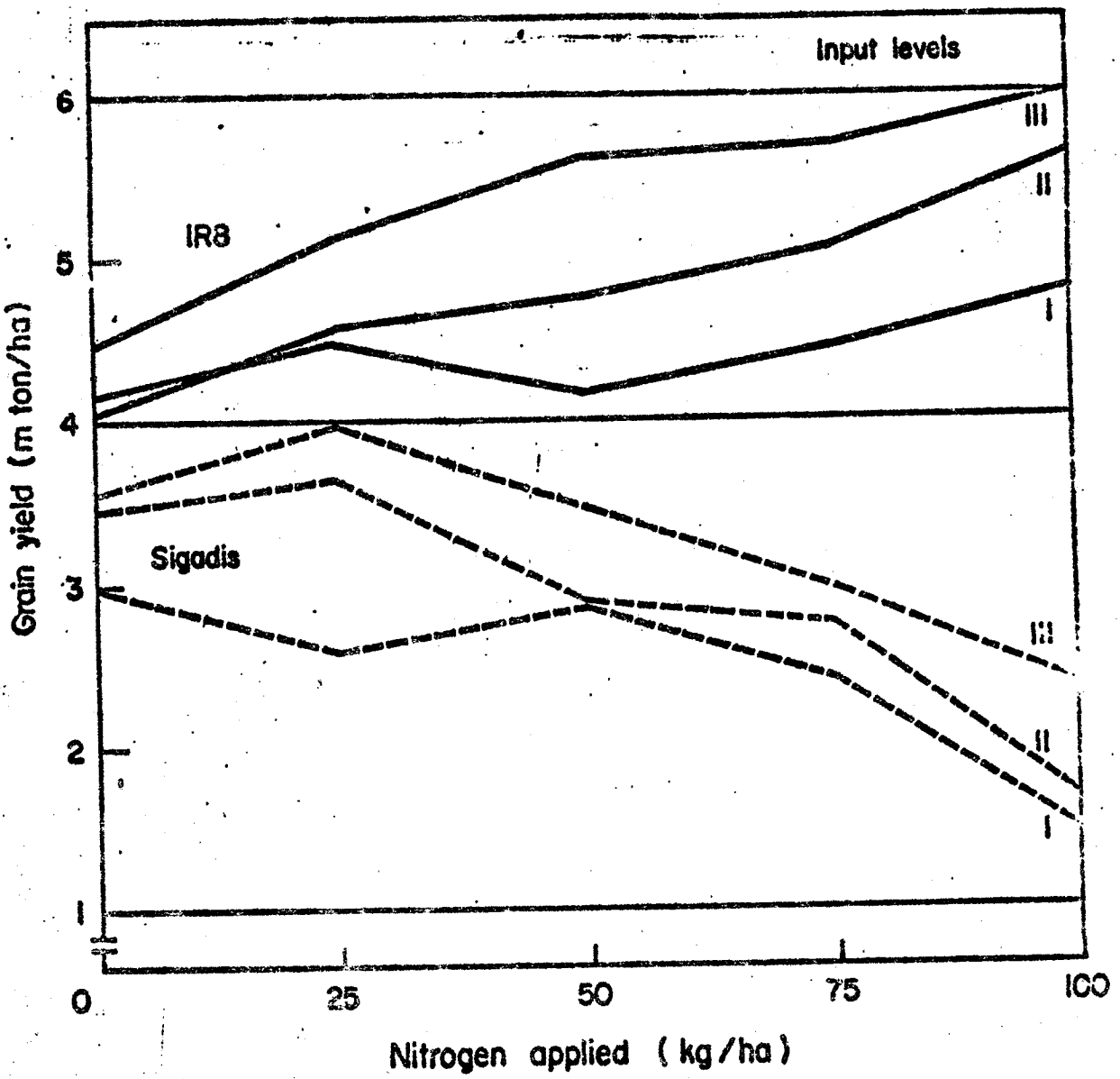

Fig. 3.--Effect of Varietal Types, Levels of Nitrogen and Protective Chemicals on the Grain Yield of Rice.

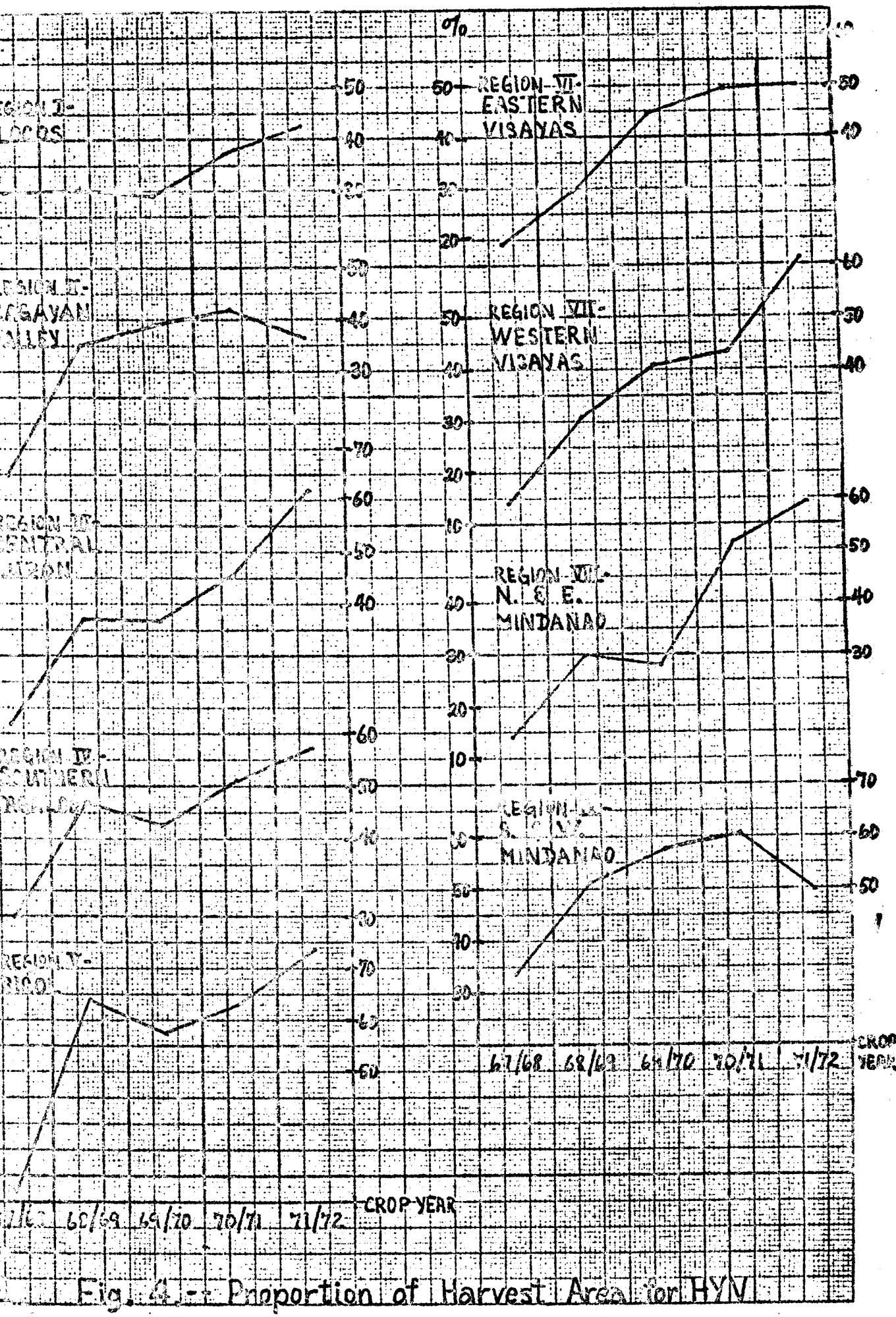

Fig. 4 -- Proportion of Harvest Area for HYV

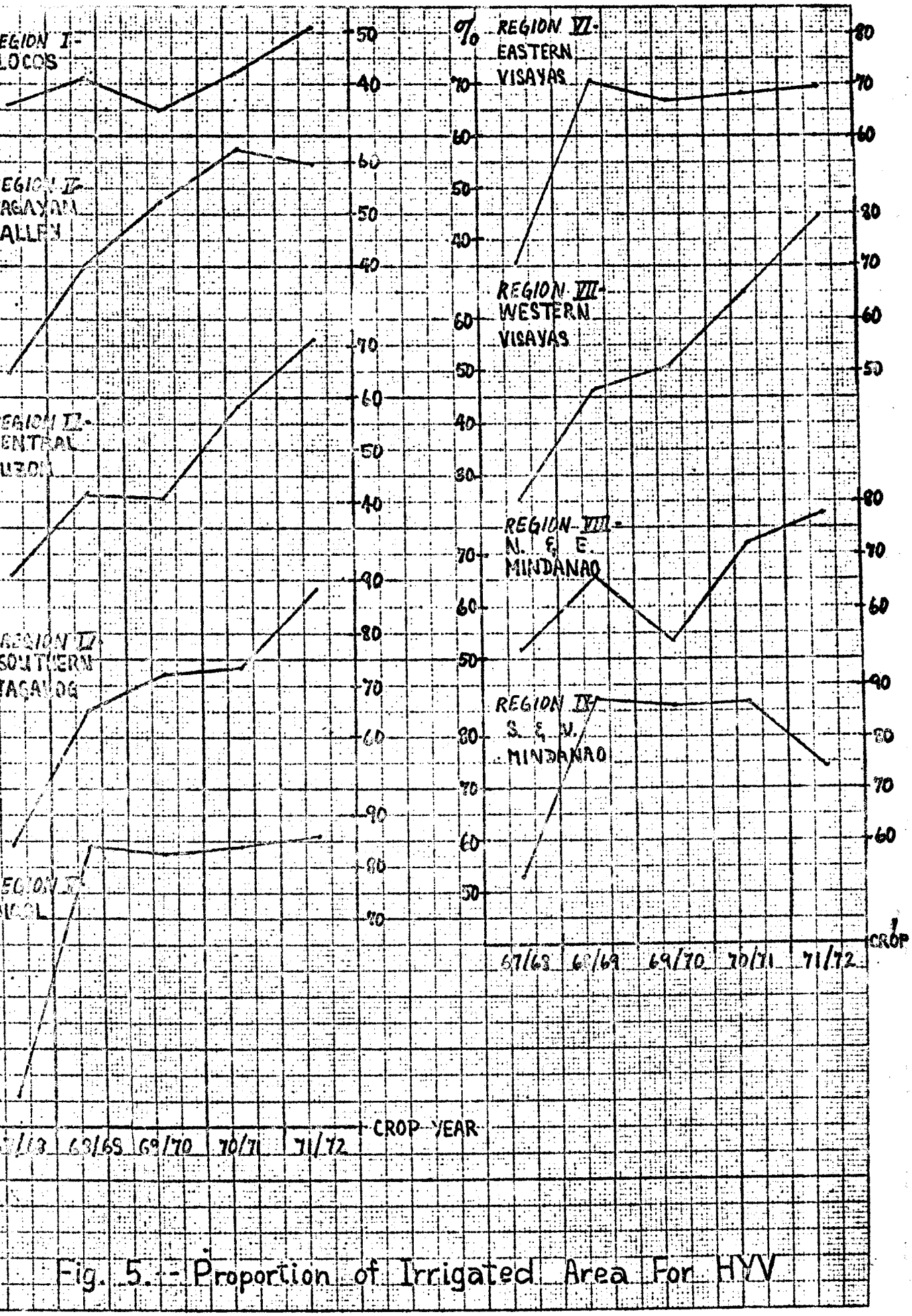

Fig. 5.- Proportion of Irrigated Area For HYV

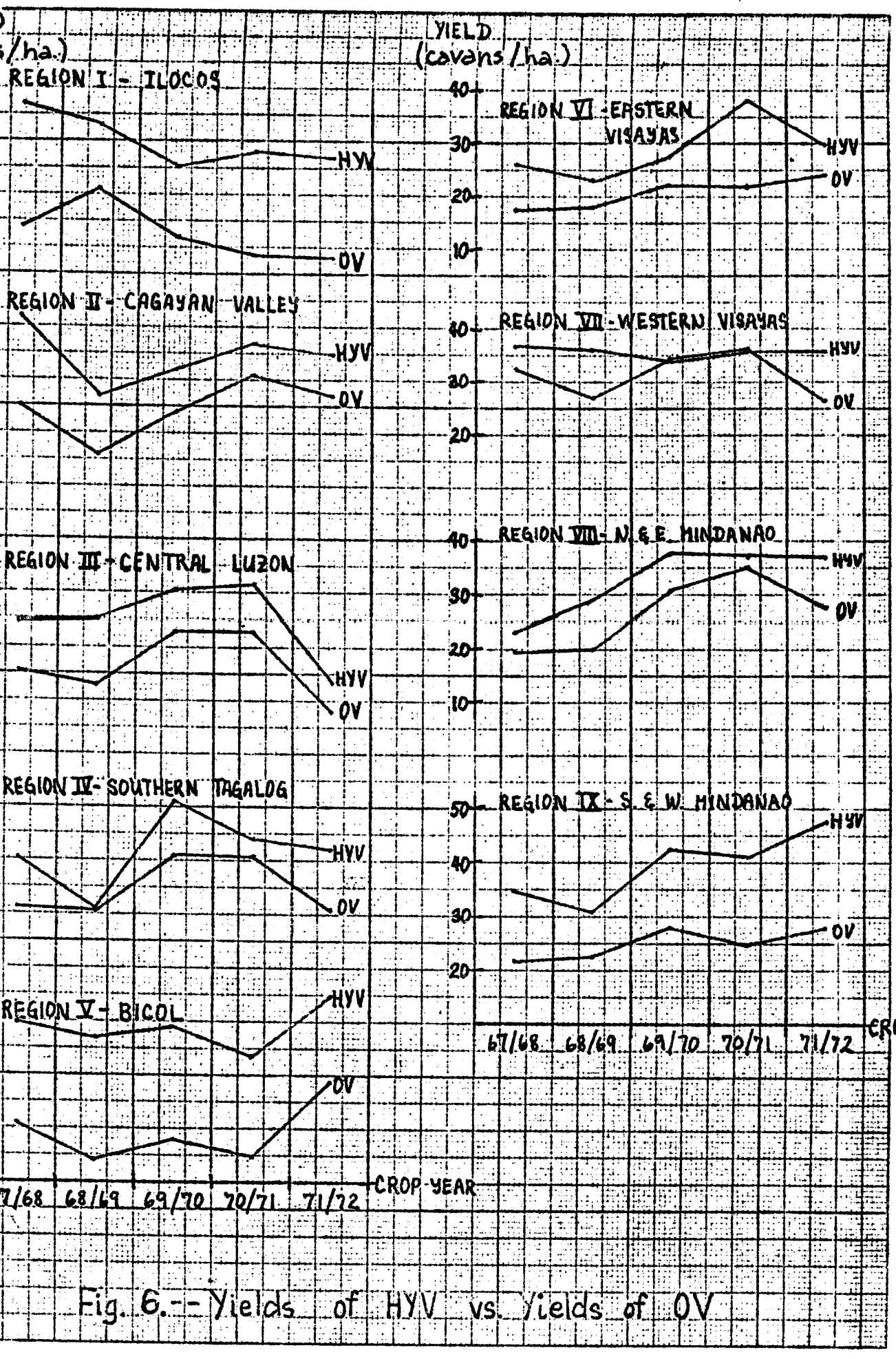

Fig. 6.-- Yields of HYV vs. Yields of OV

APPENDIX A

Provincial Components of Regions

Regional Composition
Used in Tables 1.3-1.11, 1.16

Ilocos

1. Abra
2. Batanes
3. Benguet
4. Bontoc (Mt. Province)
5. Ilocos Norte
6. Ilocos Sur
7. La Union

Cagayan Valley

1. Cagayan
2. Isabela
3. Kalinga-Apayao
4. Ifugao
5. Nueva Vizcaya

Central Luzon

1. Bataan
2. Bulacan
3. Nueva Ecija
4. Pampanga
5. Pangasinan
6. Tarlac
7. Zambales

Southern Tagalog

1. Batangas
2. Cavite
3. Laguna
4. Marinduque
5. Mindoro Occidental
6. Mindoro Oriental
7. Palawan
8. Quezon
9. Rizal

Western Visayas

1. Aklan
2. Antique
3. Capiz
4. Iloilo
5. Negro Occidental
6. Negros Oriental
7. Romblon

Eastern Visayas

1. Bohol
2. Cebu
3. Leyte
4. Southern Leyte
5. Northern Samar
6. Western Samar

Northern & Eastern Mindanao

1. Agusan
2. Bukidnon
3. Camiguin
4. Lanao del Norte
5. Lanao del Sur
6. Misamis Occidental
7. Misamis Oriental
8. Surigao del Norte
9. Surigao del Sur

Southern & Western Mindanao

1. Northern Cotabato
2. Southern Cotabato
3. Davao del Norte
4. Davao del Sur
5. Davao Oriental
6. Sulu
7. Zamboanga del Norte
8. Zamboanga del Sur

Regional Composition
Used in Tables 1.3-1.11, 1.16

Bicol

1. Albay
2. Camarines Norte
3. Camarines Sur
4. Catanduanes
5. Masbate
6. Sorsogon

APPENDIX A

Provincial Components of Regions

Regional Composition
According to 1972 Government Reorganization Plan

Ilocos	Western Visayas
1. Abra	1. Aklan
2. Benguet	2. Antique
3. Mt. Province	3. Capiz
4. Ilocos Norte	4. Iloilo
5. Ilocos Sur	5. Negros Occidental
6. La Union	
Cagayan Valley	**Central Visayas**
1. Batanes	1. Bohol
2. Cagayan	2. Cebu
3. Ifugao	3. Negros Oriental
4. Isabela	4. Siquijor
5. Kalinga-Apayao	
Central Luzon	**Eastern Visayas**
1. Bataan	1. Leyte
2. Bulacan	2. Southern Leyte
3. Nueva Ecija	3. Northern Samar
4. Pampanga	4. Eastern Samar
5. Pangasinan	5. Western Samar
6. Tarlac	
7. Zambales	
Southern Tagalog	**Western Mindanao**
1. Batangas	1. Sulu
2. Cavite	2. Zamboanga del Norte
3. Laguna	3. Zamboanga del Sur
4. Marinduque	
5. Mindoro Occidental	
6. Mindoro Oriental	
7. Palawan	
8. Quezon	
9. Rizal	
10. Romblon	

Regional Composition
According to 1972 Government Reorganization Plan

Bicol	Northern Mindanao
1. Albay	1. Agusan del Norte
2. Camarines Norte	2. Agusan del Sur
3. Camarines Sur	3. Bukidnon
4. Catanduanes	4. Camiguin
5. Masbate	5. Lanao del Norte
6. Sorsogon	6. Lanao del Sur
	7. Maranao
	8. Misamis Occidental
	9. Misamis Oriental
	10. Surigao del Norte
	11. Surigao del Sur

Southern Mindanao
1. Davao del Norte
2. Davao Oriental
3. Davao del Sur
4. North Cotabato
5. South Cotabato

Source: Bureau of Agricultural Economics