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DEVELOPMENT
THE PHILIPPINE VIEWPOINT

Jose M. Lawas

SOUTHEAST ASIA DEVELOPMENT ADVISORY GROUP

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AGRICULTURAL DIVERSIFICATION AND DEVELOPMENT

THE PHILIPPINE VIEWPOINT

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AGRICULTURAL DIVERSIFICATION AND DEVELOPMENT: THE PHILIPPINE VIEWPOINT

by

JOSE M. LAWAS

INTRODUCTION

This paper presents a brief discussion of agricultural diversification as a means of accelerating agricultural development in the Philippines.* Specifically, it examines the present state of Philippine agriculture and the direction its development is expected to take in the immediate future; the place agricultural diversification may have in the process of modernizing traditional agriculture; and the identification of crop and livestock enterprises and research studies which are appropriate to programmed agricultural development.

I. AGRICULTURAL DIVERSIFICATION: A PROLOGUE

a) The Meaning of Agricultural Diversification

The reference "diversified farming" connotes a farming enterprise which includes several crop and livestock sub-enterprises; the greater the number of sub-enterprises, the more diversified the farm. Defined in this way, agricultural diversification becomes a function of two elements: (1) the number of sub-enterprises and (2) the income derived from each. That is, the degree of diversification may be measured in terms of the magnitude of income earned by each sub-enterprise. A farm having a number of such enterprises each of which contributes a major share to the total income of the farming business is said to be more diversified than a farm for which the major source of income is a single commodity, while its other products contribute only meagerly to its income.

There are several reasons for diversifying agricultural production:

1. To reduce risk of a complete crop failure;

* The author is indebted to Dr. Ruben L. Villareal, Dr. Benjamin Fontanilla, Deputy Commissioner Domingo Tapiador, and the other members of the Technical Sub-Committee of the Philippine Executive Committee which was organized for the Agricultural Diversification Seminar, for their contributions to the preparation of this paper.

2. to distribute labor, equipment and other production inputs as evenly as possible throughout the year;

3. to provide intermediate products, or by-products to a major activity, such as supplying feed grains to livestock;

4. to aid in the control of weeds, insect infestation and plant diseases; and in the maintenance of livestock sanitation by such means as producing several crops in rotation;

5. to maintain and improve soil productivity through control of soil erosion and increasing soil fertility;

6. to better distribute money income throughout the year and, at the same time, to maximize income by adopting the most profitable combination of high-yielding and high-income-producing enterprises.

Developing an agricultural diversification program requires a comprehensive understanding of soil topography, drainage, conservation problems, culture practices, yield potential, land classification and other permanent land features that may affect production. Complete knowledge of the past, present and future behaviors of the markets and marketing systems for the products and resource inputs is also necessary.

II. AGRICULTURAL DIVERSIFICATION AND THE MODERNIZATION OF TRADITIONAL AGRICULTURE

In his book, *Economic Crises in World Agriculture*, Schultz advances these hypotheses (and they are convincingly supported by empirical evidence) of traits characterizing a static or traditional agriculture:

"1. Given the land at the disposal of farmers, and the state of their knowledge, they under-utilize the land the way they farm. Nor are they misallocating the reproducible material capital.

2. Given the land and the forms of material capital available to farmers and the state of their knowledge, they misallocate their own labor or other labor that is available to them.

3. The rate of return to investment in order to increase production in traditional agriculture is very low."

In other words, farmers who are bound by traditional agriculture are in general not inefficient in using the agricultural factors of production at their disposal. They have attained a level of economic equilibrium, since the state of art in which they are bound has remained practically unchanged for generations. These farmers have exhausted the productivity of all resources available to them. Because only niggardly investment opportunities are open to them, inducements for additional investment in traditional factors of production are few and slight. Accordingly, the way toward transforming traditional agriculture into a modern sector is to inject into the system the new, improved agricultural inputs which afford relatively high pay-offs. These inputs must be made available to farmers and the farmers must learn to use them efficiently. This implied then that farmers in the traditional stage of development are in general experiencing a state of economic disequilibrium. They are in process of adjusting to effective means of utilizing agricultural resources, including the new improved inputs, which are becoming available to them.

Another insight into the general process of transforming a low-productive traditional agriculture into a high-productive modern sector is given in the context of economic growth-stage sequences, using Rostow's leading sector approach as the framework for the analysis.

A synthesis of various approaches to examining patterns of agricultural development in the sequence of their developmental stages is presented in Table 1.[1]

In this growth-stage model, the arrival of the transitional growth stage can be hastened by emphasizing biological innovations and the intensive utilization of labor. The importance of mechanization, public social overhead investments, institutional modifications and public infrastructure investments is implicit in later stages of agricultural development.[2]

1 C. R. Wharton, "Research on Agricultural Development in Southeast Asia", Journal of Farm Economics, Vol. 45, December 1963, pp. 1161-1174

2 V. W. Ruttan argued that irrigation and mechanization are highly important in the early stage of development, since water supply and the time of farming operations affect the productivity of biological innovations which are regarded as appropriate to Stage 1. See V. W. Ruttan, "Growth Stage Theories and Agricultural Development Policy", The Australian Journal of Agricultural Economics, Vol. 9, No. 1. pp. 17-32.

Table 1. Summary of Ten Major Characteristics of Agricultural Development, from Stage I through Stage II and into Stage III

General Character	Stage I (Static)	Stage II (Transitional)	Stage III (Dynamic)
1. General values, attitudes, motivations	Negative or resistant		Positive or receptive
2. Goals of production	Family consumption and survival		Income and net profit
3. Nature of the decision-making process	Arational or traditional		Rational or "choice making"
4. Technology of state of art	Static or traditional with no (or slow) innovation		Dynamic or rapid innovation
5. Degree of commercialization of farming	Subsistence or semi-subsistence		Commercial
6. Degree of commercialization of farm inputs	Family labor and farm produce		Commercial
7. Factor propositions and rates of return	High labor/capital ratio; low labor return		Low labor/capital ratio; high labor return
8. Institutions affecting or serving agriculture and rural areas	Deficient and imperfect		Efficient and well-developed
9. Availability of unused agricultural resources	Available		Unavailable
10. Share of agricultural sector in total economy	Large		Small

Source: C.R. Wharton, "Research on Agricultural Development in Southeast Asia", Journal of Farm Economics, Vol. 45, December 1963, pp. 1162.

This table is a synthesis of the models of Perkins-Witt, Johnston-Mellor and Hill-Mosher.

In the process of transforming a static agriculture into a dynamic one, as Perkins and Witt[3] emphasized, the commercial sector exercises a strong influence upon the adoption of technological innovation. Johnston and Mellor[4] refer to the importance of transforming the subsistence agriculture into a small commercial sector. Mosher[5] in describing the activities needed for implementing the elements which are "essentials" and "accelerators" of agricultural development, emphasized the importance of creating a progressive rural structure, possibly in "areas having immediate potential for agricultural growth."

These agricultural-development models provide useful guides for formulating policy concerning diversification intended to promote development in developing countries such as the Philippines.

First, they suggest that it is highly probable that introducing agricultural diversification programs, intended to improve the economic efficiency of farmers in traditional agriculture, will not contribute to economic growth;

Second, the acceptance of diversification into farming activities depends on the availability of improved agricultural inputs, since the rate of acceptance by farmers is a function of the profitability of the new imputs;

Third, if new agricultural inputs can afford farmers relatively high pay-offs, agricultural diversification of either commercial or subsistence farms would contribute more to economic growth if it were introduced in areas having immediate potentials for agricultural development.

III. AGRICULTURAL DIVERSIFICATION UNDER PHILIPPINE CONDITIONS

a) Present State of Art in Philippine Agriculture

Agricultural production was at an extremely low level in 1945. In spite of a substantial recovery in respect to physical resources, total farm output of 1946 was only 58 percent of 1937's,

3 M. Perkins and L. Witt, "Capital Formation: Past and Present", Journal of Farm Economics, Vol. 43, May 1961, pp. 333-343

4 B. F. Johnston and J. W. Mellor, "The Role of Agriculture in Economic Development", American Economic Review, Vol 51, No. 4, September 1961, pp. 566-593.

5 A. T. Mosher, Creating a progressive Rural Structure, Agricultural Development Council, Inc., New York, N. Y. 1969.

or about 38 percent of that attained by 1955. Much of the investment in agriculture went into the cultivation of arable land left idle during the war. In 1947, the country's farm output rose about 53 percent over 1946. The rapid rate of recovery declined, however, to about 9 percent in 1948; and in 1949, farm output increased by only 3 percent. Factors influencing this trend may have been (1) the unfavorable weather conditions; (2) the widening spread of production; (3) the widening spread of dissident elements in most agricultural regions; (4) the slow rate of rehabilitation in the livestock, poultry and sugar industries; and (5) the low level of demand for some Philippine export crops.

From 1950 to 1953, the rate of growth in farm output increased. The increase in 1950 was about five times that achieved in 1949. The rate dipped slightly during the next two years, but soared again in 1953 to a high of 12 percent gain over 1952 production. The recovery of industrial production in the United States late in 1949 gave impetus to the rapid expansion of the agricultural export sector of the Philippines. Moreover, the outbreak of the Korean War in 1950 brought about a major increase in demand for Philippine agricultural exports.

When the Korean conflict ended late in 1953, the world market for Philippine agricultural exports declined sharply. The growth rate of agricultural output decreased from 12 percent in 1953 to about 3 percent in 1954.

From 1956 to 1960, the production trend continue to decline. The growth of the export sector during this period was adversely affected by the gradual imposition of tariff duties and marketing quotas on a number of Philippine exports in the United States market. Development efforts in agriculture were mostly directed to expansion of food production for local consumption. The sustained trend of growth in aggregate farm output was largely through food production. The trend of commercial crop production tended to be directly associated with the flexible trend of the United States quotas for Philippine products. In 1959, the rate of total farm production increased, due mainly to favorable weather.

From 1948 to 1960, agricultural output increased at an annual compound rate of 3.4 percent. Of this yearly growth; utilization of land input accounted for 51 percent; labor input, 14 percent; fixed capital, 9 percent; working capital, 15 percent; and technology, 11 percent.[6]

6 J. M. Lawas, Output Growth, Technological Change and Employment of Resources in Philippine Agriculture; 1948-1975, Ph.D. Thesis, Purdue University, Lafayette, Indiana, September 1967.

In this connection, it is worth mentioning that a production function of the Cobb-Douglas type estimated from the aggregate cross-sectional data of the Philippine agriculture in 1948, revealed that marginal cost was about equal to marginal revenue for each of the factors of production included in the analysis. If this is correct, the analysis above implies that Philippine agriculture as of 1960 was still predominantly traditional.[7]

Only rather recently, significant headway was again made in the development of Philippine agriculture. Technological advancements coupled with realistic government programs have resulted in substantial production gains. Crops, forest products, livestock, fish and fishery products in 1969 showed an overall increase of 6.8 percent above 1968.

In palay production, output growth has been largely attributable to the increasing yields (see Table 2).

Development of new high-yielding palay varieties and introduction of essential supporting activities have uncovered considerable growth-potentials in output per unit of the areas planted in the programmed period. In the immediate years to come, rice production is expected to reach a rate more rapid than the growth in effective demand for rice by local consumers.

Table 2. Palay: Average Annual Rates of Growth
(in percent, figured cumulatively)

	8-Year Period [1] 1952/53-1954/55 to 1960/61-1962/63	15-Year Period [1] 1952/53-1954/55 to 1967/68-1969/70
Area	2.3[2]	1.7[2]
Production	2.5	2.6
Yield	0.2	0.9

1 Averages figured for each three-year period
2 Planted in earlier period and harvested in later period

Sources: 15-Year Period, Bureau of Agricultural Economics (mimeo); 8-Year Period, Ernesto C. Venegas and V. W. Ruttan, "An Analysis of Rice Production in the Philippines", Economic Research Journal (December 1964), p. 160.

7 Prior to 1964, the annual increase in palay output was accounted for mostly by increases in area planted. The rate of area increase has started to decline since 1965, however.

Over-production of rice will create an entirely new set of problems. It is more than likely that the price of rice will go down, and with costs of production increasing while appropriations available to government remain insufficient to fully implement a rice-procurement program at a reasonable price-support level, it is quite possible that gains attained through the so-called "Green Revolution" will be greatly vitiated. This possibility is increased by the lessening of demand for rice in the world market, now that most rice-importing countries are approaching self-sufficiency. Further, there is keen competition in rice trading on the world market by the major rice-exporting countries.

This dramatic and swift breakthrough to increased rice production has set the stage for yet further revolutionizing of the phases and patterns of agricultural production in the Philippines. Adjustments will have to be made so that the country is kept self-sufficient in rice but without a glut of it. At the same time, development efforts now are being begun serving other enterprises which can help to maintain the momentum of development that was started by the "Green Revolution" in rice.

At present, most of the progressive agricultural areas in the country are commodity-specific. These are areas where farmers have adopted agricultural inputs of improved quality and relatively high pay-off. Theoretically, as noted earlier, these are the areas where agricultural diversification may have the best potential for initial success.

After defining agricultural diversification, identifying its place in the process of modernizing traditional agriculture, and describing the present state of art in Philippine agriculture, we have the frame within which to identify the plant and animal enterprises which are essential to diversification and development. These will be considered in the light of the present four-year agricultural development program. But diversification at farm-level is already appearing, and before proceeding to a discussion of national planning policies, it may be interesting to cite examples of diversification already being practiced in the Philippines.

Example 1. Rice with upland crops - Bradfield's concept of multiple-cropping although relatively new, has been applied on a limited scale by some progressive farmers. Basic to it is "wise and full utilization of the land". This involves the growing of a wide range of selected upland crops such as vegetables, soybeans (both dry and edible), sweet corn, field crops, grain sorghum and sweet potatoes in rotation with rice which is the principal rainy season crop. A typical cropping calendar of this sort is shown in Table 3. A few other rotations are shown diagrammatically in Figure 1.

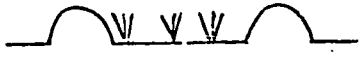
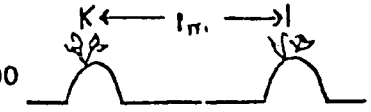
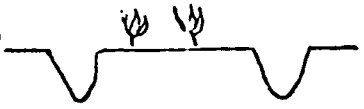
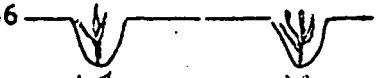
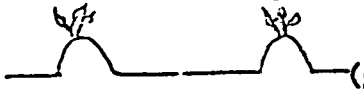
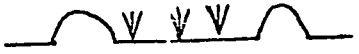
Example 2. Sugarcane with legumes - In the province of Negros Occidental where sugarcane is the main crop, inter-cropping with mongo, peanuts or soybeans has been getting more attention from the planters. The return per peso invested in the intercrop is very good (Table 4) and this makes legumes a very promising aid toward ameliorating the country's socio-economic problems. Planting of legumes as an intercrop is shown schematically in Figure 2.

Example 3. Coconut with fruits and vegetables - It is common in the provinces of Batangas and Cavite to see wide patches of vegetables laid out between rows of pineapples that are growing under papaya trees interplanted with coconut trees. This system ensures that the farmer will have cash from vegetables while he is waiting about a year for the papaya trees to become productive, about one and one-half years for the pineapple crop, and five to eight years for the coconut trees.

Example 4. Fish with vegetables - A unique rotation of fish with vegetables is practiced in the Candaba swamps. During the rainy season the swamps become fishponds and when the water recedes in late October, melons and watermelons take over in the rich soil of the swamp.

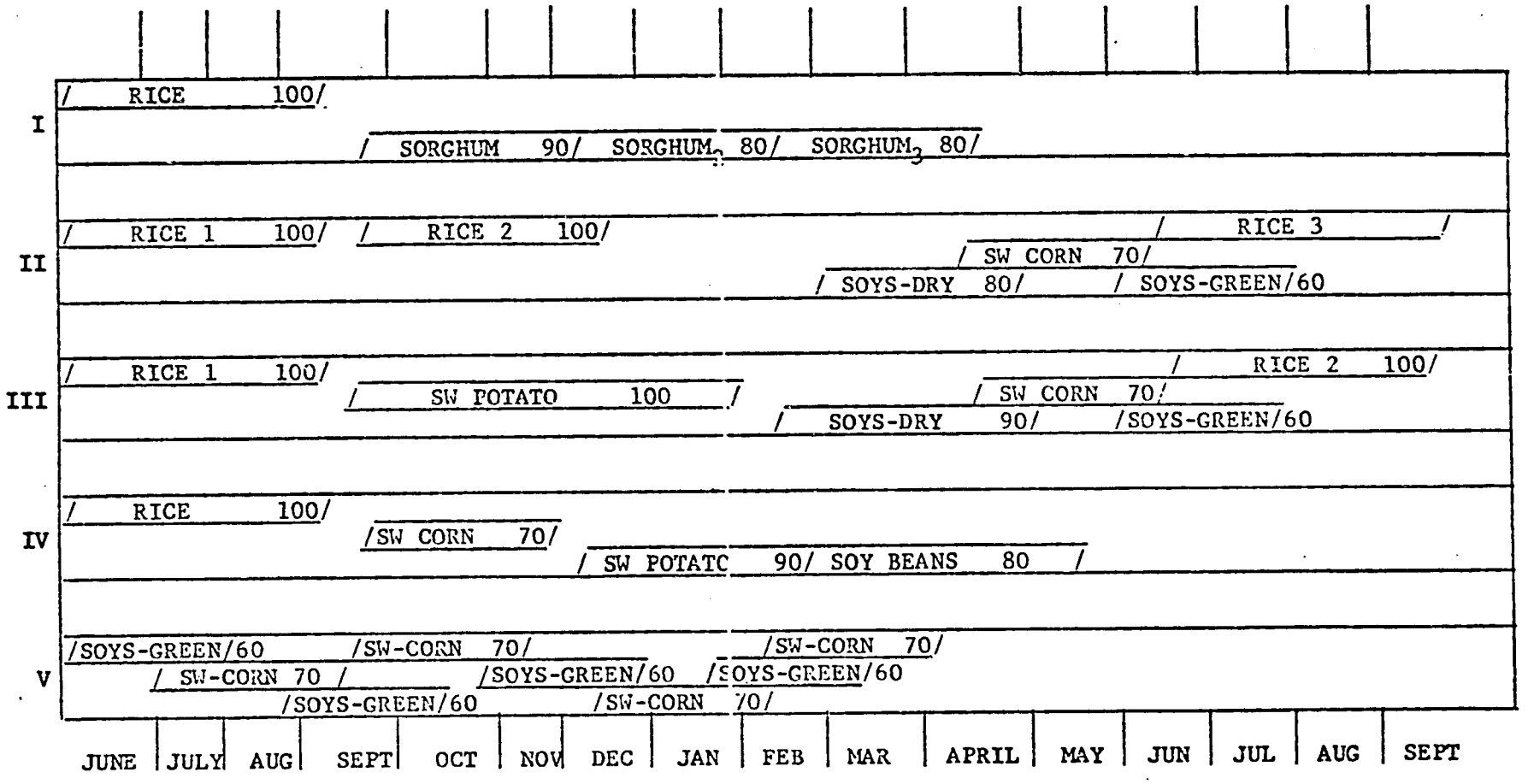
Example 5. Fish with plants and animals - Through a system of "skypond" (or upland) fish farming which has been started recently, fish can be produced in the hinterlands where the protein supply is minimal or critical. One such "skypond" is in Sibul Springs, San Miguel, Bulacan. This pond is actually impounded rain water that cascades from the surrounding watersheds (hilly areas of about 7-8 hectares). This body of water produces about 3 tons of fish per hectare per year and also serves as a reservoir of drinking water for

Table 3. TYPICAL CROPPING CALENDAR[1]

Crop	Date of Planting	Date of Harvest	Number of days	Tillage Operations	Av. Yields T/ha Crop	Av. Yields T/ha By-product	Price ($US)	Gross Income per hectare ($US)
1. Rice	June 1	Sept. 10	102		5.00	5.00	100	500
2. Sw. potatoes	Sept. 15	Dec. 4	100		25.00	20.00	40	1000
3. Soybeans (dry)	Dec. 27	Mar. 17	85		2.50	-	100	250
4. Sw. corn	Mar. 1	May 5	66		40,000	15.00	.02	800
5. Soybeans (Vegetable)	May 1	July 1	60		6,000 (green pods)	6.00	.10	600
6. Rice	June 1	Sept. 10	102				TOTAL	3150

1 - Adapted from the paper presented by Dr. Richard Bradfield in the 3rd Seminar-Workshop on Vegetable Research and Production held in Baguio City on April 10-12, 1969.

FIGURE 1. - PLANTING AND HARVESTING DATES FOR CROPS IN A FEW ROTATIONS[1]



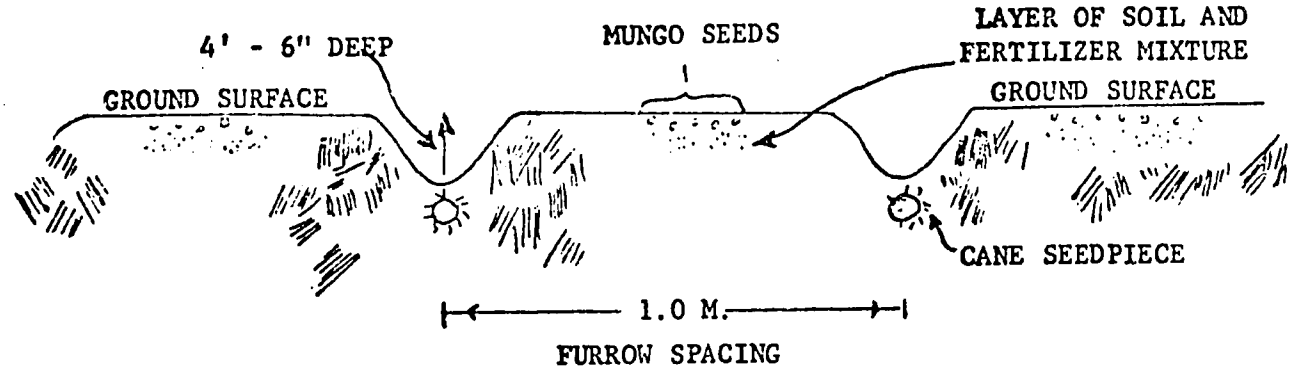
1 - Adapted from the paper presented by Dr. Richard Bradfield in the 3rd Seminar- Workshop on Vegetable Research and Production held in Baguio City on April 10-12, 1969.

TABLE 4. Yields, cost and returns from intercropping sugarcane with legumes in four plant crop trials in 1966-68.[1]

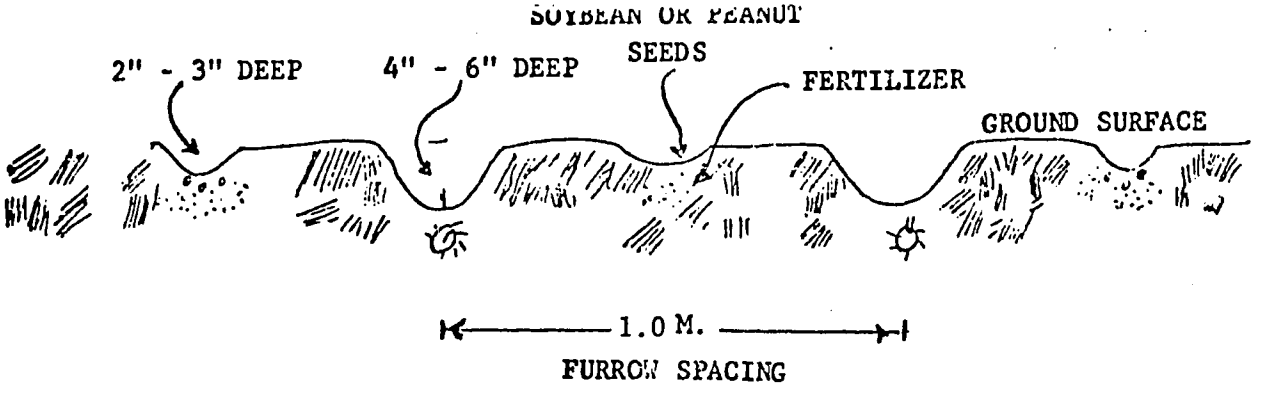
DATA COMPARED	CONTROL	SOYBEAN	MUNGO	PEANUT
Intercrop yield, Cav./ha:	-	4.94	8.76	9.89
Gross income from intercrop, pesos/ha.[2]	-	271.70	635.11	741.75
Direct cost of production of intercrop, pesos/ha.[3]	-	202.58	223.71	298.73
Net income from intercrop, pesos/ha.	-	69.12	411.40	443.02
Return per peso invested on intercrop, pesos:	-	1.34	2.84	2.48
				H.S.D.5%
Sugar yields in plant crop: TC/ha	81.068	80.801	79.199	84.333N.S.
PS/TC	1.28	1.28	1.34	1.38 N.S.
PS/ha	104.97	104.42	106.09	116.05 N.S.
64% Planter's share of sugar produced, PS/ha.:	67.81	66.829	67.897	74.272
Gross value of planters' sugar share at P29.801, pesos/ha.[4]	2,002.06	1,991.53	2,023.48	2,213.32
Direct cost of production of cane, pesos/ha:	805.74	792.84	787.41	804.86
Net income from cane, pesos/ha.:	1,196.32	1,198.76	1,236.00	1,408.52
Net income from cane and intercrop, pesos/ha.:	1,196.32	1,267.88	1,647.48	1,851.54
Added return from intercropping cane with legumes, pesos/ha.:	-	71.56	451.16	655.22
Return per peso invested in cane and intercrop, pesos:	-	2.27	2.63	2.68

1 Adapted from Victorias Milling Company, Inc., Circular No. 1, S. 1970.
2 Price per ganta of clean seeds in 1967-68: soybeans P2.90 and peanuts P3.00.
3 Direct costs of production per hectare for the intercrops in 1967-68 were: furrowing P20.00, planting P17.85, fertilizer application P26.78, fertilizer cost P62.00, spraying (insecticide) P7.35, insecticide P12.50, seeds P2.20-P3.00 (see table footnote a/) and costs of harvesting and processing of seeds (soybeans P34.10, peanuts P92.25, mungo P79.03).
4 The price of P29.801 per picul sugar (PS) is based on 70% A-Sugar at P31.52 per picul and B-Sugar at P25.79 per picul in 1967-68.
H.S.D. - Honest significant difference
N.S. - Not significant

FIGURE - 2. Planting the legume intercrop [1]



2-A PLANTING THE MUNGO INTERCROP



2-B PLANTING THE SOYBEAN OR PEANUT INTERCROP

1 Adapted from Victorias Milling Company, Inc., Circular No. 1, S. 1970.

animals (carabaos and cattle). Furthermore, it provides irrigation water during the dry season and thus contributes to water and soil conservation.

Example 6. Rice* with ducks - Duck raising is a profitable industry around Laguna de Bay. After the typhoon season (August to November), feed is a problem because the snails which are the ducks' principal food have become embedded in mud and sand, and are not available again until January. To tide them over this period of scarcity, ducks are taken into the harvested rice fields until January. In other areas, such as Pampanga, Pangasinan and the Bicol region, ducks are loosed into newly-harvested rice fields to pick out the remaining grains and the snails.

Agricultural diversification under the present national four-year agricultural development program may be viewed from two aspects: (1) national level and (2) farm level. For the national level, the policies which guide the national planning for agricultural diversification may be seen reflected in the objectives of the current four-year program.

1. Continued expansion of rice production

A main objective is to continue the spread of high-yielding varieties of rice throughout the gradually expanding irrigated areas in order to keep the Philippines at least self-sufficient in this cereal.

2. Bridging the protein gap

With self-sufficiency in cereals having been achieved, emphasis in the next four-year program will be given to achieving self-sufficiency in meat (beef, pork and chicken); in the corollary production of white corn, yellow corn, sorghum and soybeans; and in fish. The goal is to increase production sufficiently to satisfy effective demand, thus reducing imports and conserving foreign exchange; and to provide a higher level of nutrition.

* For a better understanding of the possibilities of diversifying rice farms, the several Provinces' planting and harvesting calendars are given in Appendix A.

3. Expansion of exports

There are twin objectives here: to remove the bottlenecks to expansion of output of traditional commercial crops (sugar, coconut and abaca) and to develop export markets for non-traditional exports such as yellow corn, sorghum, cornstarch, poultry, eggs and pork -- all within the program period. In food production secondary activities will also include efforts to increase production of selected fruits and vegetables, particularly those which replace imports or have great export potential, and milk.

On the farm level, farmers are being encouraged to raise crops and/or animals that are specifically included in the national agricultural development program. However, this is not meant to discourage them from raising the product or combination of products that will give them the best income. It is here that research workers may find fruitful academic exercises, in assisting farmers to determine the levels of factor-factor relationship, factor-product relationship and product-product relationship which will best serve them.

In the implementation phase, promising enterprises will be identified for specific locations through continuing intensive applied research. With respect to extension services, the government will continue to follow the method of concentrating its resources in a few vital areas at a time, rather than dispersing its men and money over an area so large that the effort is ineffective. This means that optimum use of government personnel and budgets is expected from deployment of these resources in high-priority areas and from coordination of government financial institutions so as to provide lending resources to these main areas within the next four years.

Land classification efforts will thereafter be implemented by various agencies of government, with the Department of Agriculture and Natural Resources supervising and coordinating the program.

1. Classification of the remaining unclassified land, into permanent forest, agricultural land and other purposes. This will mean re-surveying and re-classifying present agricultural lands and forest areas in order to define their boundaries, and establishing the permanent boundaries of forests and other land-use areas.

2. Measurement of lands, both public and private, to identify boundaries and corners for the purpose of titling. This will include cadastral surveys with combined aerial photogrammetry and conventional survey methods (ground, transit and tape).

3. Detailed soil survey and land-capability classification of all areas that are currently in agricultural production, as well as land that shall have been classified as alienable and disposable in Activity I. This will include collecting and analyzing of soil samples throughout the country.

4. Based upon the land-capability classifications, land-use planning will utilize current marketing information on both inputs and outputs in determining the optimum use of land.

These activities are to be undertaken each year within the planning period, in provinces tagged according to their priority during the present effort. Slight modification will be made in the alignment of the provinces (corrections determined by an area's importance to agriculture) but in such a way that the amount of work and the sequence of activities will be evenly distributed over the four-year period.

Greater attention also will be given to research in agricultural marketing. With the increasing commercialization of agriculture and the diversification possibilities brought about by technological advances in production and marketing, more systems-analysis types of research will be undertaken during the program period. Specifically, these will include agribusiness studies of:

pork, poultry, beef and milk cattle and carabao
freshwater, municipal and commercial fishing
soybeans, sorghum, mushrooms, cassava and other selected fruits and vegetables.

The following additional specific projects are also being suggested:

1. Breeding for high yield and early maturing of vegetables, legumes, cereal crops etc. to allow for as many crops as possible within a year to permit higher yields per hectare per day.

2. Determination of the best system of multiple cropping which involves cereal crops, sugarcane, legumes and vegetables to maximize production per day and to maximize land utilization.

3. Determination of the feasibility of converting some of those rice fields or marginal rice fields where water is adequate for the purpose, into fishponds which can be used either entirely for fish production, or half the year for fish and half the year for agriculture (rice or other cash crop).

4. Studies of large-area water impoundments which can serve as highly productive fishponds and at the same time aid in conservation of rain water, help control floods and prevent soil erosion, provide irrigation water and help to increase agricultural production from surrounding areas.

5. Studies of diversified fish farming, e.g. piggery with fishpond and orchard (rambutan trees on the dikes); poultry with fishpond and commercial vegetable garden; poultry and piggery with fishpond; piggery with ricefield and fishpond; poultry and commercial goat raising (in houses like chicken-houses) with fishpond and orchard; ducks with fishpond.

6. Studies of the conversion of "low-protein" food (for animal consumption) into "high-protein" food (for human consumption), such as using sorghum for fish feed.

7. Studies of cattle ranching, and of fattening cattle on coconut and sugarcane plantations.

8. Make long-run and short-run demand and supply projections, including studies of price elasticities, income elasticities, cross elasticities for each of the relevant crop and animal enterprises.

9. Make regional studies to discover optimum trade and production patterns for agricultural enterprises in the region.

IV. AGRICULTURAL DIVERSIFICATION AND DEVELOPMENT: AN EPILOGUE

Developments in agricultural production and marketing in the Philippines and in other countries of the region, tend to make agricultural diversification increasingly important to future agricultural progress. Properly implemented, agricultural diversification may not only accelerate development but may also lessen the inequities in income distribution in agriculture. If it is poorly administered, however, diversification may deter further development. Thus, to ensure its effectiveness, it is highly essential that the agrisupport services[8] be provided which allow for its wider adoption by farmers.

8 Mosher identified certain "clusters of activities" as being basic requirements for agricultural development: (1) research and development of new and improved farm (and related) technology; (2) arranging for the importation and/or domestic production of the farm supplies and equipment needed to put the new technology into use; (3) creating a "progressive rural structure", or "organization of the countryside" that provides channels through which goods and information can move easily back and forth between society; (4) creating and maintaining adequate incentives for increasing farm production; (5) improving agricultural land; and (6) educating and training technicians to accomplish all these tasks competently. A. T. Mosher, Creating a Progressive Rural Structure, Agricultural Development Council, Inc., New York, N. Y., 1969.

Appendix A. Philippine Rice Planting and Harvesting Calendar

Regions and Provinces	First Crop				Second Crop			
	Irrigated		Unirrigated		Irrigated		Unirrigated	
	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting
Philippines								
Ilocos								
Abra	June-Aug.	Oct.-Jan.	May-July	Oct.-Dec.	Jan.-Feb.	May-June	-	-
Batanes	-	-	-	-	-	-	May-June	
Benguet	-	-	June-July		-	-	-	-
Bontoc (Mt. Prov.)	-	-	June-July		-	-	-	-
Ilocos Norte	-	-	May-Sept.		-	-	Nov.-Feb.	
Ilocos Sur	June-Sept.	Oct.-Jan.	June-Sept.	Oct.-Jan.	Dec.-Feb.	March-May	-	-
La Union	June-Sept.	Oct.-Jan.	May-Sept.	Sept.-Dec.	Dec.-Feb.	April-June	-	-
Cagayan Valley								
Cagayan	July-Dec.	Nov.-April	July-Nov.	Dec.-April	Jan.-June	May-Oct.	-	-
Isabela	Sept.-Oct.	Dec.-March	Aug.-Oct.	Nov.-Feb.	March-May	July-Aug.	-	-
Apayao-Kalinga	-	-	July-Dec.		Feb.-June		-	-
Ifugao	-	-	June-July		-	-	-	-
Nueva Vizcaya	July-Oct.	Dec.-Feb.	July-Aug.	Dec.-Jan.	March-May	July-Sept.	-	-
Central Luzon								
Bataan	June-Aug.	Oct.-Dec.	July-Aug.	Oct.-Nov.	Jan.-Feb.	May-June	-	-
Bulacan	July-Dec.	Nov.-April	July-Sept.	Nov.-Dec.	Oct.-Dec.	March-May	-	-
Nueva Ecija	July-Oct.	Nov.-Jan.	July-Oct.	Nov.-Jan.	Nov.-April	Feb.-Aug.	-	-
Pampanga	July-Aug.	Dec.-Jan.	July-Aug.	Dec.-Jan.	Jan.-Feb.	May-June	-	-
Pangasinan	June-Aug.	Sept.-Jan.	May-Aug.	Sept.-Jan.	Nov.-March	March-July	-	-
Tarlac	July-Sept.	Nov.-Feb.	June-Aug.	Sept.-Nov.	Dec.-Feb.	April-June	-	-
Zambales	June-July	Oct.-Dec.	June-Aug.	Oct.-Dec.	Jan.-March	April-May	-	-
Southern Tagalog								
Batangas	June-Sept.	Nov.-Dec.	June-Aug.	Sept.-Nov.	March-June	June-July	Dec.-Feb.	March-May
Cavite	June-Oct.	Oct.-Feb.	July-Sept.	Nov.-Dec.	Nov.-May	April-Nov.	-	-
Laguna	not distinct		May-June	Oct.-Nov.	not distinct		-	-
Marinduque	June-Aug.	Oct.-Dec.	June-Aug.	Oct.-Dec.	Nov.-Jan.	March-May	Nov.-Jan.	March-May
Mindoro Occidental	July-Dec.	Sept.-Dec.	July-Aug.	Nov.-Dec.	Dec.-Jan.	April-June	-	-
Mindoro Oriental	July-Dec.	Sept.-Dec.	July-Aug.	Nov.-Dec.	Dec.-Jan.	April-June	-	-
Palawan	June-Aug.	Sept.-Nov.	July-Aug.	Oct.-Nov.	Oct.-Dec.	Jan.-March	-	-

Appendix A. Philippine Rice Planting and Harvesting Calendar

Regions and Provinces	First Crop				Second Crop			
	Irrigated		Unirrigated		Irrigated		Unirrigated	
	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting
Quezon	June-Sept.	Oct.-Jan.	June-Sept.	Oct.-Jan.	Nov.-March	March-June	Nov.-Jan.	March-May
Rizal	July-Sept.	Nov.-Jan.	July-Sept.	Nov.-Jan.	Feb.-March	May-June	-	-
Bicol								
Albay	May-July	Oct.-Dec.	May-July	Oct.-Nov.	Dec.-Feb.	March-May	Dec.-Jan.	March-April
Camarines Norte	Nov.-Jan.	Feb.-April	Nov.-Jan.	Feb.-April	May-July	Aug.-Nov.	June-July	Sept.-Nov.
Camarines Sur	Jan.-July	Oct.-Dec.	June-July	Nov.-Dec.	Nov.-Jan.	April-June	Dec.-Jan.	May-June
Catanduanes	May-July	Nov.-Dec.	May-July	Nov.-Dec.	Jan.-Feb.	April-May	Jan.-Feb.	April-May
Masbate	June-July	Oct.-Nov.	May-June	Sept.-Oct.	Dec.-Jan.	April-May	-	-
Sorsogon	June-July	Oct.-Nov.	-	-	Dec.-Feb.	-	-	-
Eastern Visayas								
Bohol	May-June	Oct.-Nov.	May-June	Oct.-Nov.	Nov.-Jan.	March-May	Nov.-Jan.	March-May
Cebu	-	-	June-Aug.		-	-	Nov.-Dec.	
Leyte	July-Dec.	Oct.-Nov.	July-Dec.	Oct.-Nov.	June-July	Sept.-Oct.	-	-
Southern Leyte	June-July	Oct.-Nov.	June-July	Oct.-Nov.	Dec.-Jan.	March-April	Dec.-Jan.	March-April
Northern Samar	-	-	Nov.-Dec.		-	-	June-July	
Eastern Samar	-	-	Nov.-Dec.		-	-	June-July	
Western Samar	June-July	Oct.-Nov.	June-July	Oct.-Nov.	Dec.-Jan.	April-May	Dec.-Jan.	April-May
Western Visayas								
Aklan	April-Aug.	Aug.-Oct.	June-Aug.	Sept.-Oct.	Sept.-Jan.	Jan.-April	Sept.-Jan.	Jan.-April
Antique	May-June	Aug.-Oct.	May-June	Aug.-Sept.	Aug.-Oct.	Dec.-Jan.	Aug.-Oct.	Dec.-Jan.
Capiz	April-June	Aug.-Nov.	May-Aug.	Sept.-Dec.	-	-	-	-
Iloilo	Jan.-Aug.	Aug.-Dec.	Jan.-Aug.	Sept.-Dec.	Sept.-Dec.	Dec.-March	Aug.-Oct.	Dec.-March
Negros Occidental	June-Aug.	Oct.-Dec.	-	-	Nov.-Dec.	April-May	-	-
Negros Oriental	May-Oct.	Oct.-Feb.	July-Oct.	Sept.-Jan.	Nov.-March	Feb.-Aug	-	-
Romblon	-	-	June-July		-	-	Nov.-Dec.	
Northern & Eastern Mindanao								
Agusan	July-Aug.	Dec.-Jan	July-Aug.	Dec.-Jan.	Oct.-Dec.	March-April	Oct.-Dec.	March-April
Bukidnon	July-Oct.	Oct.-Jan.	July-Oct.	Oct.-Jan.	Nov.-March	Feb.-May	-	-
Camiguin	-	-	-	-	-	-	-	-
Lanao del Norte	June-Aug.	Oct.-Dec.	Dec.-Jan.	April-May	June-Aug.	Oct.-Dec.	Dec.-Jan.	April-May
Lanao del Sur	May-July	Nov.-Jan	May-July	Nov.-Jan	Jan.-March	May-July	-	-

Appendix A. Philippine Rice Planting and Harvesting Calendar

Regions and Provinces	First Crop				Second Crop			
	Irrigated		Unirrigated		Irrigated		Unirrigated	
	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting	Planting	Harvesting
Misamis Occidental	May-June	Oct.-Nov.	-	-	Oct.-Dec.	March-April	-	-
Misamis Oriental	June-Oct.	Oct.-Nov.	-	-	Dec.-April	April-May	-	-
Surigao del Norte	Nov.-Jan.	March-May	Nov.-Jan	March-May	June-July	Oct.-Nov.	-	-
Surigao del Sur	Oct.-Jan.	Feb.-May	Oct.-Jan.	March-May	July-Aug.	Sept.-Oct.	-	-
Southern & Western Mindanao								
Northern Cotabato	April-June	Aug.-Dec.	May-Aug.	Sept.-Dec.	Dec.-Feb.	April-June	Dec.-Feb.	April-June
Southern Cotabato	April-June	Aug.-Dec.	May-Aug.	Sept.-Dec.	Dec.-Feb.	April-June	Dec.-Feb.	April-June
Davao del Norte	June-July	Nov.-Dec.	June-July	Nov.-Dec.	Jan.-Feb.	May-June	Jan.-Feb.	May-June
Davao del Sur	June-July	Oct.-Nov.	May-June	Sept.-Nov.	Dec.-Jan.	March-April	-	-
Davao Oriental	June-Aug.	Sept.-Dec.	June-Aug.	Sept.-Dec.	Dec.-Feb.	March-May	Dec.-Feb.	March-May
Sulu	-	-	April-Aug.		-	-	-	-
Zamboanga del Norte	June-July	Oct.-Nov.	June-July	Oct.-Nov.	Nov.-Dec.	Feb.-March	Nov.-Dec.	Feb.-March
Zamboanga del Sur	-	-	June-Aug.		-	-	Dec.-Jan.	

Source: NFAC, 1970 (mimeo).