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# SECURITY AND ASSISTANCE IN THAILAND: SUPPLEMENT ON THE THAI "RICE PREMIUM"

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## FOREWORD

This Supplement presents the supporting data and analysis for the discussion of the Thai rice "premium" (export tax) presented in Chapter VII of Security and Assistance in Thailand (U), RM-4744-AID/ISA, September 1965 (Secret). The Supplement was prepared by Vincent D. Taylor, one of eight members of a RAND team that performed a six-month field study of U.S. assistance in Thailand and Laos under the joint sponsorship of the Agency for International Development and the Office of the Secretary of Defense (International Security Affairs).

This analysis of the economics of the Thai rice premium is being published as an unclassified supplement to make it available to Thai and other economists concerned with agricultural problems and policy in Thailand.

Special thanks are due Dan Usher, now at Nuffield College, Oxford, England, whose analysis of the Thai rice trade, and whose comments and suggestions contributed greatly to the preparation of this Supplement.

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## THE THAI RICE PREMIUM

There is a growing realization among Thai economists that the rice premium, the largest of several rice export taxes, greatly reduces the prices farmers receive for their rice. This realization has led to widespread discussion of the pros and cons of reducing or eliminating this premium. An attempt is made here to clarify the basis for this discussion by presenting an analysis of the effects of the rice taxes on farm prices, the cost of living, farm incomes, rice production, and government revenues. No attempt is made to evaluate the balance between the advantages and disadvantages of reducing rice taxes in Thailand.

## THE EFFECTS OF RICE TAXES ON FARM PRICES

Until recently, there has not been enough collection and analysis of data to have a clear picture of the role played by rice taxes in the determination of farm prices. However, a number of studies of the issue have recently been completed, and the picture can now be drawn more clearly.[1] It is worth reviewing the results of these studies, since they reveal that rice taxes are a larger factor in farm prices than has been commonly believed.[2]

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[1] Particularly valuable are: Chaiyong Chuchart and Sopin Tongpan, The Determination and Analysis of Policies to Support and Stabalize Agricultural Prices and Incomes of Thai Farmers (With Special Reference to Rice Premium), sponsored by a SEATO Special Research Award, Bangkok, May 1965; and Dan Usher, Notes on the Thai Rice Trade (Preliminary), Bangkok, mimeographed, 1965.

[2] In what follows "rice taxes" will mean all taxes on rice, that is, milling tax plus export taxes. "Export taxes" will mean all taxes levied on exported rice, that is, municipal tax, Thai export tax, and the rice premium.

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One can break down the costs incurred in processing one metric ton of paddy[1] for export as follows:
(all monetary figures in baht)[2]

| | |
|---|---|
| Transport to mill | 0 - 80 |
| Cost of milling | 44 |
| Miller's profit | 10 |
| Milling tax | 3.8 per cent of gross sales |
| Transport to Bangkok | 18 - 156 |
| Commissions, middleman, and exporting costs | 90 |
| Municipal and export tax | approximately 4.7 per cent of export value |
| Rice premium | approximately 36 per cent of export value |

The export value in early 1965 of the rice derived from a ton of paddy ranged between 1,350 and 1,850 baht (including the receipts from rice bran sold locally). The variation in export value was due partially to differences in rice types (long grain versus short grain, white rice versus glutinous rice, and so on), but a major factor was the variation in the percentages of head (unbroken) rice and broken rice from a milling run. Head rice has a much higher value than broken rice; so the higher the percentage of head rice in a milling run, the higher the value of the rice derived from the paddy. The major factor in determining the yield of head rice is the quality of the paddy, although it also depends partially on the milling equipment, humidity, and how long the rice has been stored. The difference in milling yields from different qualities of paddy will be reflected in the price paid the farmer; thus prices for paddy must be discussed in terms of various qualities.

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[1] Paddy is unmilled rice. Paddy when milled yields husks, bran, and rice.

[2] One baht is approximately equal to 5 cents, or 20 baht equals one U.S. dollar. All of the figures in this section, unless otherwise noted, are from Usher, op. cit. Prices are those at harvest and therefore do not include returns from storage.

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First consider the price of a low quality paddy, which yields rice with an export value of 1,306 baht (f.o.b.), plus bran worth 44 baht, for a total value of 1,350 baht.[1] Assume the farm is located in Nakorn Phanom, about 30 kilometers from the nearest rice mill. A reasonable estimate for the cost of transporting a ton of paddy to the mill is 40 baht and of transporting the milled rice to Bangkok, 100 baht, making a total transport cost of 140 baht. As noted in the previous table, all other costs of processing for export except rice taxes total 144 baht. The various taxes total 585 baht: milling tax, 25 baht; municipal and export taxes, 65 baht; rice premium, 495 baht. Subtracting all of the taxes and costs of processing from the total value of 1,350 baht, one finds that the price received by the farmer for his ton of paddy is 481 baht. These figures are summarized below:

| | |
|---|---|
| Total export value (including bran) | 1,350 baht |
| Total rice taxes | 585 |
| Processing costs and middleman profits | 144 |
| Transportation costs | 140 |
| Price received by farmer | 481 |

If all taxes on the rice trade were eliminated and processing costs and middleman profits remained the same, the price received by the farmer would increase 122 per cent to 1,066 baht. Under the possibly more reasonable assumption that processing costs and middleman profits would increase by 10 per cent as much as paddy prices, eliminating all taxes would still raise the paddy price over 110 per cent to 1,013 baht.

The distribution costs involved in the export of one ton of high quality paddy from a farm near Bangkok is summarized as follows:

| | |
|---|---|
| Total export value (including bran) | 1,714 baht |
| Total rice taxes | 664 |
| Processing costs and middleman profits | 144 |
| Transportation costs | 30 |
| Price received by farmer | 876 |

[1] All prices in this section exclude the cost of bags.

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On the assumption that processing costs and middleman profits will rise by 10 per cent of the increase in paddy prices, the elimination of all rice taxes would raise the price received by the farmer in this case by 69 per cent to 1,480 baht.

The percentage increase in price of poor quality paddy far from Bangkok is considerably greater than the percentage increase in the price of high quality paddy near Bangkok. This is partially a result of the higher transportation costs assumed for the low grade paddy, but also results because the schedule of premium rates is such that lower grades of rice bear a higher percentage tax. In early 1965 the premiums on various grades of rice as percentages of export value, in descending order of quality, were: 100 per cent rice, approximately 32 per cent of export value; 10 per cent rice, 35 per cent of export value; A-1 rice, 36 per cent of export value; and C-1 rice, 39 per cent of export value. In the cases cited, the rice premium totaled nearly 38 per cent of the export value of the rice derived from the low quality paddy, but it was only about 32 per cent of the export value of the rice derived from the high quality paddy. With the current rates, the rice premium bears most heavily on lower quality paddy, which will thus receive the greatest price benefits from the elimination of the premium.

The above calculations of the effect of rice taxes on paddy prices contained a number of implicit assumptions: (1) the domestic price of rice is equal to the export price minus extra costs and taxes associated with exports; (2) the rice trade is perfectly competitive so that changes in the domestic price of rice will be reflected in the paddy prices paid to farmers; (3) elimination of the rice premium will not affect export prices.

The first assumption must hold because exporters buy their rice from the domestic wholesale market and must compete with domestic purchasers. There could possibly be an element of monopoly profit in the markup of exporters, but Usher's study reports that the export trade is highly competitive.

Usher also found the rice milling business to be highly competitive, with apparent returns on invested capital only around 12.5 per cent

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per year. This strongly supports the correctness of the second assumption. Moreover, data presented by Chaiyong and Sopin[1] show that paddy prices followed wholesale prices for milled rice quite closely, giving additional support to assumption two.

The correctness of the third assumption is the most doubtful. One of the major arguments for eliminating the rice premium is that the rise in paddy prices will encourage farmers to plant more rice and to use more labor, fertilizer, insecticide, and capital equipment in rice growing -- causing a substantial increase in rice production. In addition, higher retail prices for rice may decrease domestic consumption somewhat. Higher production and lower domestic consumption means that Thai exports of rice will increase, and the increase could be substantial. In recent years, Thailand has generally exported between 25 per cent and 30 per cent of total production. If eliminating the premium caused a 25 per cent increase in production, the exportable surplus would nearly double.

Thailand is currently a major rice exporter (the world's largest in 1964), and any such large increase in exports would undoubtedly have a substantial short-run impact on Thai export prices. Exactly how great depends on many factors, including how fast the production response occurs, trends of rice production and demand in other countries, and the elasticity of production and demand for rice in the world market.

Without careful analysis it is impossible to estimate the price response to increases in Thai exports. However, domestic prices for paddy must necessarily be higher after the elimination of the rice premium, since only if these prices are sufficiently higher to result in increased production will there be an effect on export prices of rice. Moreover, any sharp decline in Thai export prices should be only temporary. The total world production of paddy is over 150 million tons, and Thailand's exports are only about 2 million tons; thus over the long run a doubling of Thai exports would not have any substantial effect on the world market.

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[1] Op. cit., Fig. 17.

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An important, but often overlooked, result of eliminating export taxes on rice would be to increase the prices of other farm products raised for the domestic market. This would occur because, as the marginal returns from rice farming increase, farmers would tend to expand rice production at the expense of other products, leading to a decrease in the supply and a rise in the price of these other products. The greater the substitutibility between rice production and the production of some other farm product, the more closely would the rise in price of the other product parallel the rise in the price of rice. Determining the degree of production substitutibility among the various farm products is extremely complex; thus determining the relationships between the prices of rice and the prices of other farm products would be very difficult. Currently, little is known about these relationships, and predictions of the secondary price rises that would accompany a rise in the price of rice cannot be made with any accuracy. If the relationship is close, the benefits to farmers of a reduction in rice taxes would be correspondingly enlarged, as would be the adjustments required throughout the economy.

## THE EFFECTS OF EXPORT TAXES ON RETAIL PRICES

One effect of the export taxes is to keep the domestic price of rice below the world price by the amount of the tax; thus if the export tax were eliminated, the domestic price would rise to the world price (aside from the differences in retail markups and export costs). To obtain an idea of the rise in price, consider the effect of eliminating all export taxes on 5 per cent white rice, a popular grade of rice in Thailand.[1] The export price in early 1965 was 2,775 baht per ton, the export taxes were 1,074 baht per ton, and the Bangkok retail price about 167 baht per 100 kg. Eliminating export taxes would raise the retail price by about 64 per cent to 274 baht per 100 kg. Consumption per capita is about 10 kg per month in the Bangkok area; so the current

[1] Eliminating the milling tax would have no direct effect on retail prices, as this tax is borne by the farmer.

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expenditure per capita on rice is about 16.7 baht per month. If export taxes were eliminated, expenditure per capita would rise to about 26.4 baht per month.

The direct impact on the cost of living from elimination of export taxes would moderate -- even for very low income groups. In families with a yearly family income under 6,000 baht, the average monthly per capita expenditure on food in 1962 was 90 baht -- implying an expenditure of about 73 baht on food other than rice.[1] Total monthly per capita expenditures were 160 baht. Elimination of the rice export taxes and rice premium would raise the monthly cost of rice by 9.7 baht, assuming the consumption of rice remained unchanged. This would raise the cost of living for these low income families by 6.1 per cent. Note, however, that these families spend 56 per cent of their income on food; thus if the rise in the price of rice is closely paralleled by rises in other food prices, the total effect on their cost of living would be vastly greater. Usher estimates that if all non-export food prices rise proportionally with rice prices, the cost of living increase for these families would be on the order of 25 per cent. This would seem to be clearly an overestimate, but the effect of the rice tax on other food prices is currently one of the major uncertainties. Further study to attempt to reduce this uncertainty would be extremely valuable.

## DISTRIBUTION OF THE BENEFITS FROM ELIMINATION OF EXPORT TAXES[2]

The elimination of export taxes on rice is often recommended as a measure to "help the poor rice farmer." It should be realized, however, that export taxes are quite progressive and their elimination will bring the most direct benefit to big farmers. The reason for this is that

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[1] Statistical Yearbook, Thailand, 1963, National Statistical Office, Thailand, pp. 370-371.

[2] This section discusses only the direct benefits of eliminating export taxes, that is, the extra income that would be generated by the rise in paddy prices assuming unchanged production. The next section discusses responses in rice production. Because of the uncertainties in the price response of other farm products, no analysis of the income implications of these are made.

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rice grown for consumption by the farmer and his family yields no additional real income when rice prices rise. This is best understood by looking at a farm family that grows just enough rice to satisfy its own needs. Suppose the price of rice doubles. The family is neither better nor worse off: because it sells no rice, its money income remains unchanged and because it buys no rice, it has the same amount of money to spend on goods other than rice. The higher the proportion of rice produced by a farm for the market, the greater the benefits to the farm from a rise in the price of rice. As for the effects on regional income, the larger the amount of net exports of rice from one region to other regions or countries, the greater the benefits the region receives from a rise in the price of rice.

There is at least some presumption that low quality paddy is more likely to be grown on poor farms in the poorer regions far from Bangkok. As this would be the paddy that would increase in price by the largest percentage if export taxes were eliminated, the tendency to benefit the rich regions and the rich farmers would be partially offset. As noted previously, elimination of rice taxes would result in price increases of under 600 baht per ton for low quality paddy and over 600 baht per ton for high quality paddy; thus, an assumption of a 600 baht per ton increase in all paddy prices would be relatively generous to the lower quality paddy. Calculations based on this assumption still indicate that elimination of rice export taxes would not be a particularly efficient welfare measure -- the major benefits would go to the relatively rich provinces off the Central Plains, and within these provinces to the large farmers.

A thorough understanding of this is particularly important when analyzing the implications of the rice premium for the welfare of various regions in Thailand. For instance, some people have recommended the elimination of the rice premium primarily on the basis of its value in raising incomes in the Northeast. The Northeast has recently produced about 2.5 to 3.0 million tons of paddy per year, so if the elimination of export taxes raised the market value of paddy by 600 baht per ton the contribution of rice production to money income generated

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in the area would increase tremendously. Unfortunately, most of this extra money income would go for the purchase of rice for consumption. There are no accurate statistics on exports from the Northeast to other regions, but estimates based on production less estimated consumption, seed stock, and losses, indicate that exports ranged between 0.5 and 0.8 million metric tons over the last three years (0.56 million metric tons in 1964). Even in the year where 0.8 million metric tons were exported, a 600 baht per ton price increase for paddy would have raised real income by only 480 million baht -- about 48 baht per capita. The average per capita income in the Northeast in 1963 was about 1,200 baht; thus 48 baht extra would have represented only a 4 per cent increase in per capita income.

Table 1 gives an idea of how the benefits of eliminating export taxes would be distributed among various provinces and between large and small farms.[1] The calculations are based on the assumption that eliminating export taxes would raise paddy prices 600 baht per ton in all areas. This is clearly only an approximation, and it may be that even an average of 600 baht is slightly too high. Still, the results should be fairly close to reality.

Farms are broken down into the categories of large and small farms with a large farm being 30 rai (about 1.2 acres)[2] and a small farm being less than 30 rai. A holding is defined as all land farmed principally by a single person, regardless of whether or not the land is all contiguous, or whether the land is owned or rented. In discussing the table, the terms "holding" and "farm" are used interchangeably. The dividing point of 30 rai was chosen because this is about the largest size farm that can be run as a family operation; thus large farms, as defined, are in varying degrees commercial operations.

The first three provinces in Table 1 are in the Northeast. In Buriram, 65.3 per cent of the farms are small, but the small farms get only 35.6 per cent of the extra cash income that would be generated by a 600 baht per ton increase in the price of paddy.

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[1] A more detailed breakdown by farm size is presented in Table 2.

[2] 1 rai equals 0.3954 acre.

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Table 1

DISTRIBUTION OF BENEFITS FROM A 600 BAHT/TON INCREASE IN THE PRICE OF PADDY AMONG PROVINCES AND BETWEEN LARGE AND SMALL FARMS

| Province | Farm Class[a] | Number of Holdings[b] | Per Cent of Total Holdings | Extra Cash Income[c] (B x $10^6$) | Per Cent of Total Extra Cash Income | Extra Income per Holding[d] |
|---|---|---|---|---|---|---|
| Buriram | Small | 47,715 | 65.3 | 22.25 | 35.6 | 166 |
| | Large | 25,300 | 34.7 | 40.12 | 64.4 | 1,586 |
| | Total | 73,015 | 100.0 | 62.37 | 100.0 | 854 |
| Nakorn Phanom | Small | 51,690 | 92.0 | 25.52 | 76.8 | 494 |
| | Large | 4,469 | 8.0 | 7.65 | 23.2 | 1,712 |
| | Total | 56,159 | 100.0 | 33.17 | 100.0 | 591 |
| Udornthani | Small | 68,099 | 71.6 | 70.80 | 51.5 | 11,040 |
| | Large | 27,090 | 28.4 | 66.68 | 48.5 | 2,461 |
| | Total | 95,189 | 100.0 | 137.48 | 100.0 | 1,444 |
| Chiengma | Small | 95,267 | 98.9 | 95.69 | 95.8 | 1,004 |
| | Large | 970 | 1.1 | 4.19 | 4.2 | 4,330 |
| | Total | 96,237 | 100.0 | 99.88 | 100.0 | 1,038 |
| Thonburi | Small | 12,713 | 87.5 | 10.84 | 48.6 | 853 |
| | Large | 1,812 | 12.5 | 11.45 | 51.4 | 6,320 |
| | Total | 14,525 | 100.0 | 22.29 | 100.0 | 1,535 |
| Saraburi | Small | 16,910 | 51.4 | 23.38 | 28.5 | 1,383 |
| | Large | 12,461 | 48.6 | 62.24 | 71.5 | 4,995 |
| | Total | 29,371 | 100.0 | 85.62 | 100.0 | 2,915 |
| Phichit | Small | 24,028 | 50.0 | 34.41 | 21.7 | 1,432 |
| | Large | 23,973 | 50.0 | 125.24 | 78.3 | 5,224 |
| | Total | 48,001 | 100.0 | 159.65 | 100.0 | 3,328 |

Notes:

[a]Small farms comprise all holdings of less than 30 rai (about 1.2 acres); large farms comprise all holdings of 30 rai or more.

[b]A "holding" is defined as all land farmed principally by a single person, regardless of whether or not the land is all contiguous or whether the land is owned or rented.

[c]Extra cash income received by all farms in class, assuming a 600 baht/metric ton increase in the price of paddy. Calculated by (1) finding the average farm production, subtracting 5 per cent for losses, 8 kg/rai for seedlings and 1,100 kg per holding for family consumption, (2) multiplying by 600 baht/ton, and (3) multiplying by the number of holdings in the class.

[d]Extra cash income received by all holdings in the class divided by the number of holdings in the class.

Source: Census of Agriculture, 1963, National Statistical Office, Bangkok, Thailand, Table 6 of appropriate changwat volumes.

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On the average, the extra cash income per small farm would be 466 baht, and per large farm, 1,586 baht, more than three times as much as for small farms. The average increase for the province is 854 baht per farm. Nakorn Phanom has mainly small farms; thus the average increase for the province is quite low, only 591 baht per farm. Udornthani has a slightly higher percentage of small farms than Buriram, but productivity is about 50 per cent higher for all sizes of farms; thus the average increase in cash income per farm is considerably higher. In Chiengmai, in the North, the vast majority of farms are small, but productivity is high, so the cash benefits per farm are higher than in two of the three Northeast provinces.

The last three provinces are all in the Central Plain, and it is here that the largest benefits from an increase in paddy prices would accrue -- particularly to the large farms. The percentage of large farms in these provinces and the amount of the total benefits that they receive are as follows:

| | Number of Large Farms (per cent) | Amounts of Total Benefits Received (per cent) |
|---|---|---|
| Thonburi | 12.5 | 51.4 |
| Saraburi | 48.6 | 71.5 |
| Phichit | 50.0 | 78.3 |

Even in Thonburi, which has a high percentage of small farms, the extra income of the large farms is so great that the average increase for all farms is higher than in any of the provinces considered in the Northeast or the North. In Phichit, which has the highest percentage of large farms (50 per cent) of any province considered, the average increase in cash income per farm is about 3,300 baht -- over five times as large as in Nakorn Phanom.

Although the major benefits will go to the relatively rich provinces of the Central Plains and within them to the relatively rich large farmers, this is not necessarily undesirable. If increasing rice production is the primary concern, the more of the benefits going to the large farmers, the better. These are the people with the knowledge and the opportunity to use the extra income productively and to respond to incentives of higher prices by changing and improving their farm practices.

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## RESPONSE OF PRODUCTION TO A RISE IN PADDY PRICE

Rice yields are determined by a host of factors. Some of these, such as the characteristics of the soil and the amount and pattern of rainfall, are outside the control of the individual farmer. Other factors, such as the type of rice seed, planting and cultivating techniques, fertilizer and insecticide usage can be controlled by the farmer. The farm practices employed depend partly on tradition and partly on the farmer's knowledge, but also upon the price of output relative to the price of inputs. In general, the higher the relative price of paddy, the more labor, fertilizer, and insecticide it will be economic to use on a given piece of land, and the higher will be the yield per rai. In addition, the higher the price of paddy relative to other farm prices, the more land will be devoted to rice growing. It is for these reasons that elimination of export taxes can be expected to lead to an increase in rice output. The overall production response to a rise in the price of paddy would be extremely complex and predicting the response quantitatively is impossible, but the general tendencies can be outlined.

### Effect on Labor Usage

Labor will be drawn to rice growing both from other crops and from the urban sector, and the existing farm labor supply will probably be used more intensively. Small farms consistently have significantly higher yields per rai than large farms, indicating a fairly high marginal productivity of labor in rice farming. This shows up clearly in Table 2. In the three Northeast provinces included in the table, the yields per rai on farms of less than 6 rai averaged about twice as much as those on farms of over 130 rai. In the three Central Plain provinces, the relative yields on these two classes of farms differed by about 50 per cent. Although there are undoubtedly a number of reasons for the differences in yields, a major explanatory factor certainly is that small farms are more intensively farmed -- with more care taken in plowing, planting, weeding, and harvesting.

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Table 2

MAGNITUDES AND DISTRIBUTION OF BENEFITS FROM A 600 BAHT/TON INCREASE IN THE PRICES OF PADDY

| Size-Class of Holding[a] (rai) | Number in Class | Per Cent in Class | Average Size of Plantings in Sample, by Class (rai) | Average Productivity of Plantings in Sample, by Class (kg/rai) | Paddy Available for Sale (kg) | Extra Cash Income per Farm[b] (baht) | Extra Cash Income, all Farms in Each Class[c] (baht X $10^6$) | Total Extra Cash Income Going to Each Class (per cent) |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | | | | BURIRAM - NORTHEAST | | | | |
| 2 - 5.9 | 6,047 | 8.3 | 3.6 | 244.9 | -200 | -119 | -.72 | -1.1 |
| 6 - 14.9 | 17,818 | 24.4 | 8.0 | 200.0 | 404 | 241 | 4.31 | 6.9 |
| 15 - 29.9 | 23,850 | 32.6 | 15.9 | 160.4 | 1,204 | 721 | 17.22 | 27.6 |
| 30 - 44.9 | 13,022 | 17.8 | 25.1 | 139.8 | 2,025 | 1,215 | 15.83 | 25.4 |
| 45 - 59.9 | 6,108 | 8.4 | 32.7 | 130.5 | 2,728 | 1,636 | 9.99 | 16.0 |
| 60 - 139.9 | 5,769 | 7.9 | 45.4 | 120.2 | 3,670 | 2,202 | 12.70 | 20.4 |
| 140 & over | 401 | .5 | 83.0 | 107.2 | 6,702 | 4,020 | 1.60 | 2.6 |
| TOTALS | 73,015 | 100.0 | | | | | 62.37 | 100.0 |
| | | | | NAKORN PHANOM - NORTHEAST | | | | |
| 2 - 5.9 | 13,344 | 23.8 | 3.9 | 352.3 | 208 | 124 | 1.67 | 5.0 |
| 6 - 14.9 | 25,073 | 44.6 | 7.4 | 260.3 | 781 | 468 | 11.72 | 35.3 |
| 15 - 29.9 | 13,273 | 23.6 | 14.7 | 193.1 | 1,525 | 914 | 12.13 | 36.5 |
| 30 - 44.9 | 2,998 | 5.3 | 24.3 | 155.6 | 2,260 | 1,355 | 4.05 | 12.2 |
| 45 - 59.9 | 902 | 1.6 | 30.5 | 144.2 | 2,899 | 1,739 | 1.56 | 4.7 |
| 60 - 139.9 | 529 | .9 | 42.6 | 127.6 | 3,759 | 2,254 | 1.19 | 3.6 |
| 140 & over | 40 | .1 | 26.5 | 197.9 | 3,580 | 2,147 | .85 | 2.6 |
| TOTALS | 56,159 | 100.0 | | | | | 33.17 | 100.0 |
| | | | | UDORNTHANI - NORTHEAST | | | | |
| 2 - 5.9 | 8,459 | 8.9 | 3.8 | 430.6 | 424 | 254 | 2.15 | 1.6 |
| 6 - 14.9 | 27,536 | 28.9 | 7.9 | 335.3 | 1,349 | 808 | 22.26 | 16.2 |
| 15 - 29.9 | 32,104 | 33.8 | 15.0 | 254.6 | 2,410 | 1,445 | 46.39 | 33.7 |
| 30 - 44.9 | 15,477 | 16.3 | 23.5 | 210.4 | 3,421 | 2,052 | 31.74 | 23.1 |
| 45 - 59.9 | 6,500 | 6.8 | 30.2 | 195.0 | 4,245 | 2,546 | 16.54 | 12.0 |
| 60 - 139.9 | 4,779 | 5.0 | 41.1 | 183.9 | 5,763 | 3,457 | 16.51 | 12.0 |
| 140 & over | 334 | .4 | 68.9 | 170.6 | 9,510 | 5,704 | 1.89 | 1.4 |
| TOTALS | 95,189 | 100.0 | | | | | 137.48 | 100.0 |
| | | | | CHIENGMAI - NORTH | | | | |
| 2 - 5.9 | 35,942 | 37.3 | 3.4 | 460.5 | 358 | 214 | 7.66 | 7.7 |
| 6 - 14.9 | 49,549 | 51.5 | 7.7 | 443.1 | 2,080 | 1,247 | 61.77 | 61.8 |
| 15 - 29.9 | 9,776 | 10.1 | 15.5 | 387.5 | 4,480 | 2,687 | 26.26 | 26.3 |
| 30 - 44.9 | 723 | .7 | 27.0 | 311.3 | 6,676 | 4,005 | 2.89 | 2.9 |
| 45 - 59.9 | 131 | .1 | 36.5 | 281.9 | 8,390 | 5,034 | .64 | .6 |
| 60 - 139.9 | 85 | .1 | 48.5 | 261.1 | 10,540 | 6,322 | .53 | .5 |
| 140 & over | 31 | .03 | 75.7 | 143.5 | 8,589 | 5,153 | .15 | .1 |
| TOTALS | 96,237 | 100.0 | | | | | 99.88 | 100.0 |
| | | | | THONBURI - CENTRAL PLAIN | | | | |
| 2 - 5.9 | 6,076 | 41.8 | 4.23 | 340.2 | 233 | 139 | .85 | 3.8 |
| 6 - 14.9 | 4,496 | 31.0 | 8.78 | 333.4 | 1,610 | 966 | 4.33 | 19.4 |
| 15 - 29.9 | 2,141 | 14.7 | 18.50 | 321.6 | 4,404 | 2,643 | 5.66 | 25.4 |
| 30 - 44.9 | 1,051 | 7.2 | 31.49 | 308.6 | 7,880 | 4,727 | 4.97 | 22.3 |
| 45 - 59.9 | 405 | 2.8 | 45.25 | 308.9 | 11,817 | 7,090 | 2.87 | 12.9 |
| 60 - 139.9 | 334 | 2.3 | 66.49 | 291.1 | 16,756 | 10,053 | 3.36 | 15.1 |
| 140 & over | 22 | .15 | 87.4 | 254.7 | 19,348 | 11,608 | .25 | 1.1 |
| TOTALS | 14,525 | 100.0 | | | | | 22.29 | 100.0 |
| | | | | SARABURI - CENTRAL PLAIN EAST | | | | |
| 2 - 5.9 | 1,957 | 6.7 | 4.1 | 277.3 | -55 | -329 | -.64 | -.7 |
| 6 - 14.9 | 4,712 | 16.0 | 9.4 | 276.3 | 1,288 | 722 | 3.64 | 4.2 |
| 15 - 29.9 | 10,241 | 34.7 | 18.8 | 256.1 | 3,318 | 1,991 | 20.38 | 23.4 |
| 30 - 44.9 | 6,055 | 20.6 | 31.4 | 245.0 | 5,965 | 3,578 | 21.66 | 24.9 |
| 45 - 59.9 | 3,269 | 11.1 | 43.1 | 241.5 | 8,425 | 5,055 | 16.52 | 19.0 |
| 60 - 139.9 | 2,883 | 9.8 | 64.2 | 230.2 | 12,446 | 7,466 | 21.52 | 24.8 |
| 140 & over | 254 | .9 | 108.7 | 181.5 | 16,726 | 10,034 | 2.54 | 2.9 |
| TOTALS | 29,371 | 100.0 | | | | | 85.62 | 100.0 |
| | | | | PHICHIT - CENTRAL PLAIN NORTH | | | | |
| 2 - 5.9 | 3,458 | 7.2 | 5.4 | 277.7 | 282 | 169 | .50 | .3 |
| 6 - 14.9 | 6,931 | 14.4 | 8.8 | 278.1 | 1,152 | 690 | 4.77 | 3.0 |
| 15 - 29.9 | 13,639 | 28.4 | 18.2 | 280.2 | 3,596 | 2,157 | 29.14 | 18.4 |
| 30 - 44.9 | 11,795 | 24.6 | 29.7 | 271.1 | 6,295 | 3,776 | 44.53 | 27.8 |
| 45 - 59.9 | 6,089 | 2.7 | 40.7 | 264.7 | 8,790 | 5,273 | 32.10 | 20.0 |
| 60 - 139.9 | 5,832 | 12.2 | 62.8 | 242.7 | 12,841 | 7,702 | 44.92 | 28.0 |
| 140 & over | 257 | .51 | 155.7 | 177.6 | 23,967 | 14,379 | 3.69 | 2.3 |

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Table 2 (continued)

Notes:

[a]A "holding" is defined as all parcels of land wholly or partly utilized in farm operations under the management of one single holder, regardless of occupation rights.

[b]Column (6) was calculated by dividing Column (7) by Column (1).

[c]Column (7) was calculated by: (a) finding the average farm production, subtracting 5 per cent for losses, 8 kg/rai for seedlings and 1,100 kg per holding for family consumption, (b) multiplying by 600 baht/ton, and (c) multiplying by the number of holdings in the class in Column (1).

Source:

Census of Agriculture, 1963, National Statistical Office, Bangkok, Thailand, Table 6 of appropriate changwat volumes.

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These figures imply a high marginal productivity for labor; thus a rise in paddy prices will lead to an increased demand for labor. This will lead, in turn, to higher wages, tending to reduce the incentives for more labor. The final balance between increased farm labor and decreased wages is extremely difficult to predict with any accuracy at this time.

## Effect on Land Usage

The higher returns to rice farming will increase the value of land devoted to that activity. This will create a tendency to shift from other crops to rice, to farm land that is currently unprofitable to farm, and to clear new land (where available) for rice farming. This effect will probably be largest in the Northeast where farming is fairly diversified and where much marginal and uncleared land exists. In the Central Plains most available land is already planted to rice; thus this region will probably have the smallest increase in land devoted to rice production.

## Effect on Fertilizer Usage

Thailand uses little chemical fertilizer in rice farming. As increasing the use of fertilizer is often cited as a means of increasing rice yields, it is worth studying in some detail the effect of the Thai rice export taxes on fertilizer usage.

It is important to understand that the use of fertilizer is not an all-or-none proposition. The more fertilizer one uses, the more yield one gets, but at a decreasing rate. The higher the price of paddy relative to the price of fertilizer, the more fertilizer that can be profitably used, and the greater the potential profits from fertilizer use. Moreover, the response of crops to fertilizer varies from farm to farm and year to year, depending upon the soil, seed, and water. Thus a given amount of fertilizer may be profitable on some farms in only some years and never profitable on other farms. The higher the price of paddy relative to the price of fertilizer,

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the more places and times it will be profitable to use. Using fertilizer involves the expenditure of money by the farmer, and he must risk losing some or all of that money if it does not work as expected. The risk is highest the first time, since there is more uncertainty about the response to fertilizer on the particular piece of land concerned. The higher the price of paddy relative to fertilizer, the higher will be the potential profits, the less will be the risk of loss, and the more willing will be the farmer to try fertilizer on his land.

The determinants of fertilizer usage are complex, but the relative price of paddy and fertilizer is one of the most important. This can be most clearly explained by making use of a fertilizer response curve, which shows the additional paddy yield as a function of the quantity of fertilizer used for a given piece of land under given conditions. Figure 1 shows a typical response curve,[1] labeled R. The straight lines are fertilizer cost lines, showing the cost of fertilizer in terms of paddy for various ratios of paddy price per kilogram to fertilizer cost per kg. For example, the line marked 6 indicates a fertilizer cost per kg equal to the sale price of 6 kg of paddy. This fertilizer cost line would apply if fertilizer cost 3,600 baht per ton and the farmer sold his paddy for 600 baht per ton, or if fertilizer cost 3,000 baht per ton and paddy sold for 500 baht per ton, or for any other set of fertilizer and paddy prices in the same ratio. The letter "p" will be used to represent the cost of fertilizer in terms of paddy.

The farmer can make the most gross profit by using just the amount of fertilizer that maximizes the distance between the approximate fertilizer cost line and the response curve.[2] For p = 6, this is slightly over 9 kg of fertilizer per rai. In Figure 1, the vertical

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[1]The curve itself is hypothetical, but it is based on the information supplied by Walter Scott (USOM-Thailand) that 15-16 kg of fertilizer with 16-20-10 composition will give, on an average, 115 kg additional paddy in the Northeast.

[2]Ignoring the extra labor costs required to apply the fertilizer, harvest the additional yield, and to weed the paddy field during the growing season.

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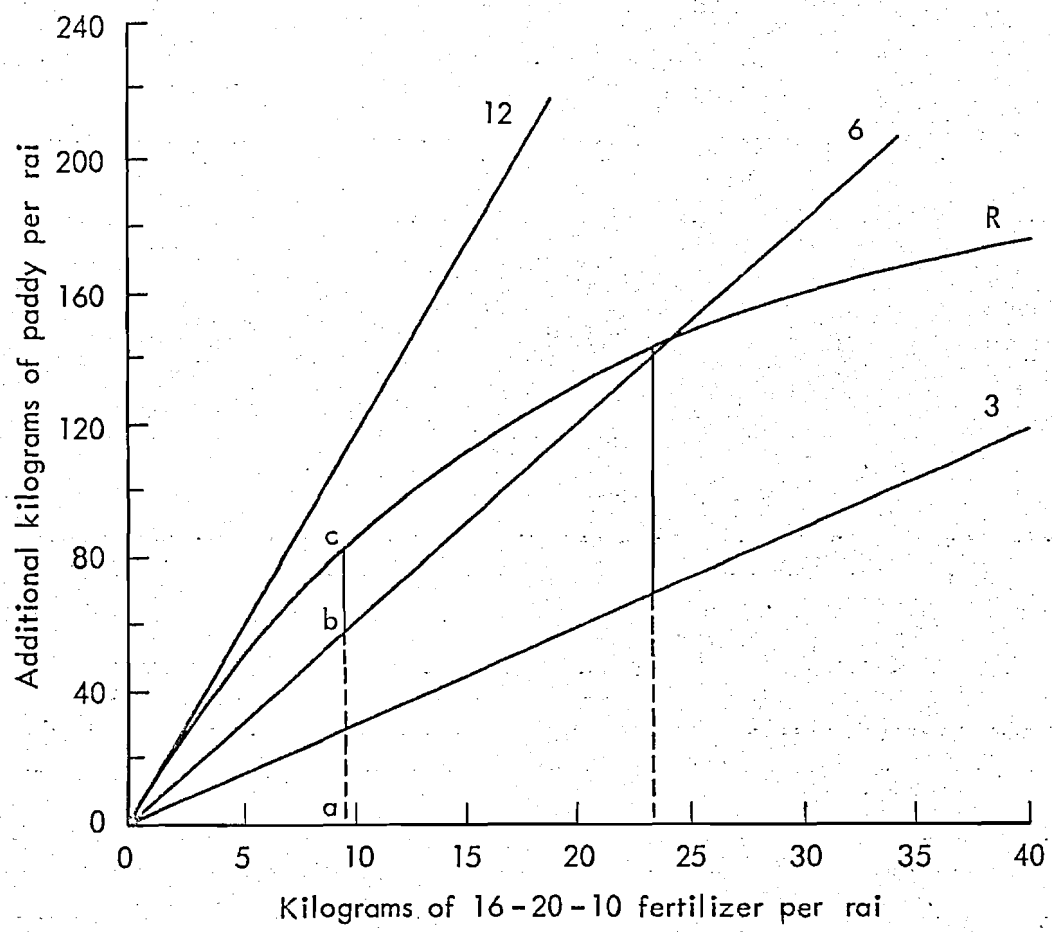


Fig.1—The use and profitability of fertilizer at various ratios of fertilizer and paddy prices

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lines rising from the horizontal axis to the response curve give the complete picture of the costs and the results of fertilizer use in this case. The total length of the line ac gives the additional yield (83 kg of paddy) due to the use of about 9 kg of fertilizer; the dotted line ab gives the cost of the fertilizer in terms of paddy (58 kg of paddy); and the solid line bc gives the net profit (25 kg of paddy). The ratio of the length of the solid line bc to the dotted line ab gives the percentage profit on the investment in fertilizer (about 45 per cent).

A p = 6 is probably appropriate for many parts of the Northeast with current prices. With this cost and response curve, a farmer with ten rai of land would have to invest the equivalent of 580 kg of paddy at the beginning of the farm season to get back 830 kg additional kilograms of paddy at harvest. This is clearly a profitable return, but for the small farmer, who obtains a yield of perhaps 250 kg of paddy per rai without fertilizer, it is a large investment for a relatively small profit. Given the risks (as he sees them), the "advantages" of fertilizer must look quite marginal. Demonstrations can show him that he would be better off using fertilizer, but he still may feel that the potential gain does not compensate sufficiently for the extra labor and risks involved.

If he uses fertilizer at all, he may use considerably less than the amount that would increase rice output to the highest net profit. It is quite common for farmers to apply fertilizer only up to the point where the additional return from an extra kg of fertilizer is some multiple of the cost of the fertilizer, perhaps because they have alternative uses for the money, because this lowers their risk of loss, or because the extra effort involved requires some return over the cost of the fertilizer. In the United States, for instance, fertilizer is often applied only up to the point where the marginal returns are 80 per cent above the marginal cost of the fertilizer. In Thailand, it is not at all unreasonable to expect that farmers generally require a marginal return of 100 per cent over cost. If

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this is the case, the farmer will apply fertilizer as if the cost of fertilizer were 100 per cent higher than its actual cost, as if, say, p = 12 rather than 6. As can be seen from the figure, with p = 12 the farmer would use almost no fertilizer.

If rice taxes were eliminated, the profit potential of fertilizer and the amount of fertilizer that could be profitably used would be increased greatly. If the price received by the farmer for paddy rose from 500 baht per ton to 1,000 baht and fertilizer remained at 3,000 baht per ton, p would drop to 3. Assuming the farmer demands a 100 per cent marginal return, he would apply fertilizer as if p = 6. He would use about 9 kg of fertilizer and obtain 83 kg of additional yield, but now the cost of the fertilizer would be equivalent to only 29 kg of paddy. His percentage of gross profit would be about 185 per cent, as compared with a profit of about 45 per cent on the same application of fertilizer when paddy sold for 600 baht per ton. Also, of course, each kilogram of paddy would be worth 1.0 baht instead of 0.5 baht; so the profits measured in kilograms of paddy underestimate the magnitude of the difference in profits. Note, however, that for a given marginal return over cost, the absolute price of the paddy is not relevant to the decision on the amount of fertilizer to use. Only the paddy price relative to fertilizer price is relevant.

As this example shows, rice export taxes undoubtedly depress the use of fertilizer; thus elimination of the taxes would lead to increased use. Note, however, that the full advantages of fertilizer can only be realized if the farmer has available a controlled water supply. If he must depend on natural rainfall, the risks associated with fertilizer usage are much higher and the average returns much lower. The high risk may continue to deter the use of fertilizer even if paddy prices rise substantially; thus although elimination of rice export taxes will increase fertilizer usage, the major increase appears likely to occur in the North and the Central Plains, where a significant fraction of the land has controlled water supplies. Moreover, the response to fertilizer is strongly dependent on the type of

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rice to which it is applied. Most of the rice types currently being used, and also those currently being selected by the Thai Rice Department, are designed to give good results with land of low fertility. With current fertilizer and paddy prices, rice seed designed to do well on low fertility soil may well be the best choice. But, as a result, response to fertilizer will be far below that which could be obtained with proper rice seed. If the price of paddy rises significantly relative to fertilizer price, rice types that are responsive to fertilizer will be essential to obtain the full potential benefit of fertilizer. Thus, if reductions in rice taxes are made, a program to select or develop and to distribute fertilizer-responsive rice types would be extremely valuable.

EFFECT ON GOVERNMENT REVENUE

The rice premium is a major source of government revenue. Although its importance has been steadily declining over the years, it still provides 8 to 10 per cent of government revenues. In 1964, a bumper export year, rice premium collections were over one billion baht. Loss of this amount of revenue in a single year would undoubtedly cause serious problems for the government. For this reason, total elimination of the rice premium in one step may not be feasible. On the other hand, a reduction in the rice premium might not lead to any loss in revenues. Exports of rice have been running between 25 and 30 per cent of total production; thus a 15 per cent increase in total production would increase exports by 50 per cent. A major argument for reduction or elimination of the rice premium is that it will cause a substantial increase in production, and the previous analysis indicates that many factors will work toward such an increase. Although predictions of the magnitude of the increase in production cannot be made with any accuracy, it is certainly within the bounds of possibility that a one-third reduction in the rice premium could lead, over a number of years, to a 15 per cent increase in rice production. Even if the increase in production were somewhat smaller, the rise in domestic prices would discourage domestic consumption; thus the

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amount available for export might still increase by 50 per cent. A one-third reduction in the rice premium together with a 50 per cent increase in exports would leave government revenue collections unchanged.

The possibility of eliminating a substantial portion of the burden of the rice premium without any loss in government revenue argues in favor of partial reduction of the premium as an initial step. This approach is further supported by the uncertainties about secondary price rises, political effects, production response, and effects on the nonfarm sectors. A partial reduction would provide an opportunity to reduce these uncertainties, improving the basis for future decisions.

## THE BURDEN OF RICE TAXES

Rice taxes substantially lower farm incomes. The depression of farm incomes is, however, offset by lower rice prices to consumers and increased revenues to government. But, a further effect of rice taxes is to reduce the amount of labor, land, and other inputs to rice production far below the levels that would be desirable for the country as a whole. This occurs because the farmer receives only 500 to 800 baht per ton for paddy that is worth 1,000 to 1,500 baht per ton in the export market. The value in the export market measures the true economic value of additional rice production to Thailand. As the analysis of production effects has shown, economic incentives are distorted and production retarded because of the depressing effect of rice taxes on paddy prices. This is the true burden of rice taxes, and it is borne not by the farmer alone but by all of Thailand.

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