

aggregate production of Tongil from 4,516/MMT in 1978 to 3,449/MMT in 1979 and with a per hectare production drop from 4.86 to 4.63 over the same time. The extreme cold of 1980 devastated the Tongil crop cutting production and yields by one-third, lowering farm income, and creating a crisis of credibility between the farmer and the guidance worker, as well as the government, which had advocated Tongil production. Thus in 1981, although figures are not yet firm, the proportion of traditional varieties of rice cultivated are likely to be about two-thirds to only one-third of Tongil. Because cultivation techniques have improved, traditional varietal yields are expected to be high.

Increasing farm income from rice has led to a decrease in other crops included in this project and an overall decline in the land utilization ratio--the land double-cropped. In 1970, it was 1.42, but in 1979 it was 1.30, indicating that farmers regard winter crops such as barley and wheat as uneconomic and that they would prefer, acting economically, to put a much smaller amount of land under winter cultivation in vegetables. "We only grow barley," as many farmers remarked, "because there is nothing else to do in winter." This lack of enthusiasm for barley, in spite of government policy pronouncements, is only balanced by the special production of two-row barley in the South under contract with brewing companies that use it for malt.

Increases in use of pesticides and herbicides, which annually now cost the farmer more than fertilizer, are reflective of the shortage of labor. Whatever their potential deleterious environmental effects, they contribute to a national short-term economic goal. Fertilizer use, however, declined considerably in 1980 (to 828,000 MT from a high of 916,000 MT in 1978), again reflecting increased costs in relation to returns.

The economic consequences of the improved varieties are apparent. Until 1977, real income had risen--due to a strong government price support, shift in favor of Tongil, and the improved technological package and cultivation techniques that have spilled over not only to traditional rice but to other crops as well. Farm income rose reducing the economic disparity between the urban industrial class and the farmer. The profitability of rice was correlated with size of area cultivated, increased productivity, and the purchase price of rice. Increases of income, although partially attributed to vegetable crops, were mostly a product of Tongil cultivation.

Since 1977, however, the margin of profitability of Tongil has declined rapidly. Yield differentials between Tongil and the traditional varieties were more than 30 percent in 1977, but only 15 percent in 1980. The higher market price for the traditional strains, and their better resistance to cold and blast made them equally profitable, at least in some areas. Because of the poor performance in 1980, many farmers will opt for risk aversion and thus grow the older, more reliable, varieties.

Wheat and barley provide a different perspective. If the value of farmers' unpaid labor and equipment are included, the costs of production