

ments conducted during 1967-1972. These net incomes were used to estimate the risks farmers take in using the several technologies. Risk was defined arbitrarily as the standardized probability of obtaining an increase in net income from the use of a given technology equal or inferior in value to: (a) 0.5 ton/ha of maize grain or (b) 0 ton/ha of maize grain.

As shown in Table 3.14 for traditional technology, risk defined as the probability of a net income of 0.5 ton/ha or less, was nearly four times as great in producing system 1.1.1.; three times as great in system 2.1.1; and 32 percent greater in the entire area—as compared with that using recommendations for unlimited capital. When defined as the probability of a net income of 0 ton/ha or less, risks using the traditional practices were nearly three times as great in producing system 1.1.1; twice as great in system 2.1.1; and about 4 per cent less for the entire area—as compared with that of using Project recommendations for unlimited capital.

Comparison of net incomes and risks using Project recommendations for unlimited capital and those for traditional practices suggests several observations about the relative risks involved: (a) for average and favorable years there is a high probability of an attractive income from using either technology; the expected net income is nearly twice as large with the Project recommendations as with traditional practices; (b) for less favorable years, the value of the net income will be equal to or less than 0.5 ton/ha of maize in many instances; the probability of these low incomes is much higher with the traditional than with the recommended technology; (c) for the least favorable years, net incomes less than zero can be expected: the probability of net losses is similar for the two technologies; and (d) net incomes using the traditional technology are sometimes (12 percent of the experiments during 1967-72) larger than the Project recommendations. Based on the available information it appears that farmers, as a whole, would assume less risk by using the Project recommendations than by using the traditional technology. There are instances, nonetheless, where farmers will lower their net incomes by switching from the traditional to the new technology. Hopefully, the frequency of these latter situations can be gradually reduced as agronomic knowledge of the area is improved.

It seems quite likely that the above evaluation of the significance of risk differs from farmers' perception of the risk involved in using the new technology. The results farmers have obtained from using the Project recommendations have been less favorable than those reported in the experiments, which can be attributed to failure to use the recommendations fully, as discussed earlier. The farmers have probably encountered a higher percentage of cases (higher than the 12 percent cited previously) where the Project recommendations have been less profitable than the traditional practices. Also, the experience of the farmers extends over a much longer span of years than the period covered in this study, and almost certainly includes years less favorable than any of those of the 1967-1972 period. It

seems reasonable to conclude that a certain percentage of the farmers in the area, perhaps one-fourth, now feel that a change from the traditional to the new technology would mean a reduction in net income from their maize in the less favorable years.

### Availability of Credit

As can be calculated from the information in Table 3.10, the average cost involved in using the Project recommendations for limited capital is 19 percent greater than for the traditional technology; the average cost of the recommendations for unlimited capital is 82 percent greater than for the traditional technology. According to the data collected in the area, only about 15 percent of the farmers have sufficient personal funds to purchase the inputs required by the Project recommendations. Thus, in deciding whether to use the new technology, the greater fertilizer cost and the necessity for credit to cover this expense is a major consideration for most farmers.

The discussion of the credit institutions in Chapter 7 suggests that the supply of credit available through the official banks for maize production has been equal to or greater than the demand in recent years. A study of 29 farmers not on credit lists from five communities in the Puebla area in 1973 indicated that there were two main reasons why more farmers did not request credit from one of the official banks: (a) 15 of the farmers (52 percent) feared that they would not be able to pay back the loan—they were particularly concerned about the possibility of an unfavorable year, and about their lack of understanding of the whole process of obtaining credit; and (b) seven of the farmers (24 percent) were repelled by the number of requisites they had to meet to qualify for a loan—they were particularly bothered by having to pay a premium for crop insurance that they felt provided no real protection.

From the standpoint of the farmer, it appears that the lack of satisfactory access to available credit is limiting his adoption of the Project recommendations. Supporting evidence for this conclusion was presented in Chapter 7—the demand for credit from the Impulsora de Puebla, which can be arranged for very simply and without crop insurance, has been far greater than the supply. Hopefully, this obstacle can be overcome, both through favorable change in the credit institutions and by increasing farmers' knowledge of the operation of the banks and the adequacy of the recommendations.

### Farmer organizations

Recognizing the farmers' credit needs for the purchase of fertilizers, as well as the difficulties individual farmers have in securing loans from the banks, the Project team began in 1969 to assist small farmers to organize and work together as organized groups. This activity of the Project team has been viewed as an essential part of the operational