

benefits using the INIA and unlimited capital technologies is \$3,078,467. This is the net benefit attributable to the research carried out in generating project recommendations for maize production. The benefit: cost ratio for the agronomic research on maize practices is 21.84.

Benefits as estimated in Table A.2 for unlimited capital do not include all the benefits derived from agronomic research. A benefit of perhaps equal importance is the detailed information on maize production relationships that has been produced. Such information has many uses. At the present time, for example, there is an energy shortage in most parts of the world and there are prospects of fertilizer rationing. The information that has been produced on maize production relationships can be useful in deciding on the most efficient way to employ a limited amount of fertilizer in the Puebla area.

The limited capital technology is an example of how a scarce resource such as fertilizer can be allocated efficiently. The total adjusted net benefits using the limited capital technology, calculated as described earlier, were \$3,038,683. The difference between this value and the total adjusted net benefits with the INIA technology is \$482,459; this is the benefit attributable to agronomic research. If the limited capital technology were the only contribution of the research program, the benefit: cost ratio would be 3.42.

The use of the limited capital technology instead of the INIA technology over the period 1967-1986, with the rate

of adoption shown in Table A.2, would represent a saving of 15,774 tons of ammonium sulphate and 69,141 tons of simple superphosphate. This amount of ammonium sulphate is equal to 53 percent of that needed each year to fertilize the 80,000 ha in the Puebla area, using the limited capital technology. The 69,141 tons of simple superphosphate is sufficient to fertilize according to limited capital technology all maize plantings in the Puebla area for a period of 11 years.

A further benefit derived from agronomic research has been the feeling of confidence on the part of the Project staff, the representatives of the service institutions, and the farmers, that maize yields can be greatly increased and with economic benefits to the farmers. This confidence in the maize technology has undoubtedly contributed significantly to a more rapid rate of adoption of Project recommendations by the farmers.

Finally, the educational benefits resulting from the agronomic research should be mentioned. The Project staff that conducted the research and many Latin American agronomists who received training in Puebla, benefited from their participation in the program. Professionals trained in Puebla have been responsible for agronomic research in similar regional programs in Honduras, Colombia, Peru, and the states of Mexico and Tlaxcala in Mexico. In general, their experience in Puebla has enabled them to achieve greater efficiency in developing improved technology, as compared to that realized in the early years in Puebla.