

4 MAIZE VARIETY IMPROVEMENT

INTRODUCTION

Prior to the Puebla Project, it was known that Chalqueño and Cónico were the predominant races of maize in the region. The Mexican Agricultural Research Institute (INIA) had done some varietal testing, and two hybrids (H-28 and H-129) were recommended for the area. A limited survey in the fall of 1966 indicated, however, that most farmers were growing native varieties. This finding was confirmed by a farm survey in early 1968 which revealed that, although 15 percent of the farmers had used hybrid maize on at least one occasion, less than 1 percent of the farmers had grown hybrids in 1967.

It seemed reasonable to expect varieties that yield more, particularly in unfavorable years, would be readily accepted by farmers and would represent an economical way to increase production. Thus, maize improvement research became an integral part of the Puebla Project. The research objective was to quickly develop improved varieties that would yield more than the available hybrids and native varieties, and that would compare favorably in terms of grain type, lodging, earliness, and disease resistance.

STRATEGY OF GENETIC IMPROVEMENT

The maize improvement program consisted of the following activities:

- (a) The collection of information from farmers throughout the Project area to establish farmer preferences as to grain type, earliness, and other morphological characteristics.
- (b) The collection of outstanding native varieties in the area. It was expected that some of these might be useful for immediate distribution, and many would be valuable as breeding materials.
- (c) The testing of promising local varieties and exotic materials at representative sites throughout the area. Initially these varietal trials were to identify outstanding genotypes, both for immediate use and as breeding materials, and subsequently to compare the performance of existing and newly produced materials.

- (d) The development of cryptic double-cross ($S_1 \times S_1$) hybrids and $S_1 \times$ double-cross hybrids. The decision to use this breeding method was based on experience in other areas indicating that it should be possible to develop a hybrid by the third year of the Project that would outyield the parental varieties by 25 to 30 percent. This timetable was dependent on growing two crops per year, through winter plantings at lower altitudes. Since the proposed life of the project was only 5 years, it was necessary to have improved materials available by the end of the third year, if they were to significantly influence production within this time period.
- (e) The development of open-pollinated varieties through mass selection. This method was chosen on the basis of research experience suggesting that increase in yield could be expected, varying from 4 to 10 percent per year. In addition, since farmers would cooperate in the selection, they would have improved seed available immediately and could continue to attain better yielding materials through their own efforts after the Project ended.



Varietal trials were carried out each year at several locations, to compare the performance of native varieties, improved varieties and hybrids, and experimental materials.