

Appendix 5

An Example of the Modified Stability Analysis

The kind of data generated from farmers' experiments in the Oaxaca project—yield data from several varieties grown on different farms in the region—can be analyzed with a modified stability analysis.

Each experiment located on a farm would be considered a trial. The average yield of all varieties included in a given trial, which is representative of the conditions of crop production at that location (i.e., the environmental index), is plotted against the yield of each variety in that trial. The relative height of the plotted line represents the general yield of the variety; the slope represents its adaptability to different environmental conditions. A flat slope represents a stable response, whereas a steep slope represents the opposite. Hildebrand (1984) recommends using a minimum of 14 farms (trials) to gain an accurate estimate of treatment differences over environments, when there is need for a wide range of environments. Clearly it is not appropriate for farmers to participate in this kind of analysis, although it is based on data generated by participatory experiments. Its results may be useful to scientists, however, and can be useful to farmers when presented in a simplified manner to discuss the appropriateness of planting the varieties tested in different environments.

The dataset from the farmer experiments in Oaxaca is small (3 to 6 farms, with two replicates per farm), but bearing this limitation in mind, they can still be used to provide an example of the possible interpretation of such an analysis. Yields of maize landraces were plotted against the environmental index for each farm where they were grown during the wet season of 1999 (Figure A5.1). As mentioned previously, the yield was the weight of the ears harvested in a 5 m strip chosen randomly in the inner two rows of the experimental plot. The six landraces included three with white grain, one with yellow grain, one with black grain, and one with red grain. Figure A5.1 shows that the red and yellow landraces (varieties 34 and 40, respectively) are the most stable (i.e., they have the flattest slope), whereas the white materials (118, 134, and 152) have a steeper slope. There is a crossover point where the white maize types start to perform better than the other maize types. This crossover indicates that in "poor" environments, the other maize types may be superior, whereas white maize may perform better in "good" environments. (Remember that for farmers in Oaxaca, grain color is an indicator of other traits, particularly duration.) Kamara et al. (1996) provide another example of this methodology for four maize varieties (three improved and one local) evaluated in three locations of Mali.

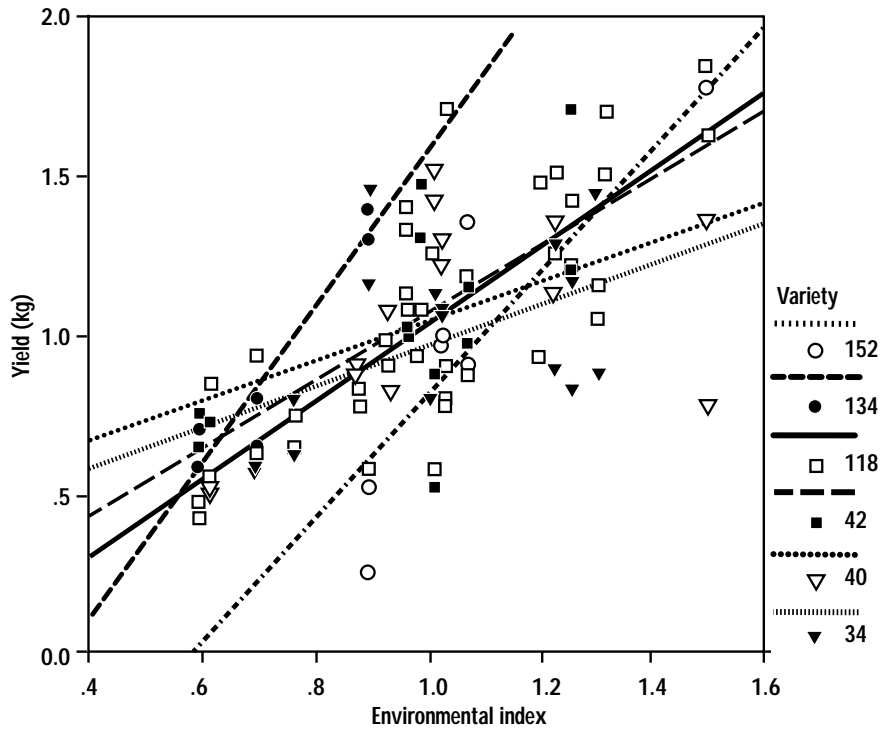


Figure A5.1 Yield response to the environmental index in six communities of the Central Valleys of Oaxaca, Mexico.