Abstract
In the Mexican High Valleys, it is necessary to develop sorghum (Sorghum bicolor L. Moench) genotypes with higher grain yields than the VA-110, the only commercial cultivar available for this region. In 1994, 47 sorghum hybrids, made by the combination of A and R cold tolerant (CT) lines developed at the Colegio de Postgraduados and crossed to cold susceptible (CS) A and R lines adapted to México's warm and subtropical climates, were evaluated. Grain yield, percent of grain set in selfed panicles and in open-pollinated panicles and days-to-bloom were measured on the hybrids, parental lines and on three controls, across three environments located at approximately 2250 m (Montecillo, both under irrigated and rainfed conditions, and Tecámac only under irrigation) in the State of México. A simple balanced lattice 8 x 8 with 4 replications was used in each experiment. The average grain yield (kg ha-1) over the three environments in the CTxCT genotypes was 4202, 3746 for the CTxCS group, 3076 for the CSxCT and only 976 for the CSxCS. The grain yield of two CTxCS hybrids (6435 and 5700 kg ha-1, respectively) outyielded that of VA-110 in 57 and 39 %, but they bloomed 20 days later. There were, however, eight hybrids as early as VA-110, and one of these outyielded VA-110 by 20 %. The great variation in grain set in selfed panicles and in open pollinated panicles, as well as in grain yield among environments, among hybrid groups and within each group, indicates that cold tolerance is a quantitative trait. Pollen viability and maybe stigma fertility are affected in genotypes highly susceptible to cold temperatures.

Keywords
Sorghum bicolor, crop physiology, crop breeding, cold tolerance.