NATURE imposes many limiting factors on crop production and one of these is frost injury to grain crops. On the western plains of Canada and the adjacent areas of the United States, the growing season for spring-sown crops is short, necessitating early sowing, and night temperatures of several degrees below freezing may occur after the grain seedlings have emerged and attained a height of 5 or 6 inches. The plants may be severely damaged with most of the exposed leaf tissues killed. New growth soon replaces the ruined parts, and to the superficial observer the effects of the frost are erased and become a thing of the past. In fact, spring frosts are generally assumed to do little permanent damage to the small grains excepting insofar as the temporary set-back might delay maturity slightly.

It seems more probable, however, that a crop which is badly frosted in the seedling stage suffers permanent injury. In careful work at Fargo, N. D., Waldron (10, 11) calculated that a frost of 6°F reduced the eventual yield of Hope, one of the wheat varieties in his experiment, by 38%. In another test, where the frost was less severe, the loss was much less, but Hope was more injured than any other variety in the test and there appeared to be definite differences in resistance to frost injury with respect to other varieties in the test. Waldron's work indicated that it is a distinct advantage to have varieties with as high a degree as possible of seedling resistance to frost damage.

An excellent opportunity to obtain comparative frost resistance on cereal varieties and hybrids under field conditions presented itself on June 4, 1935, at Saskatoon, Saskatchewan, when a fairly uniformly distributed frost occurred. At this time nearly all of the cereals were in the two-leaf seedling stage and a carefully planned experiment where freezing temperatures could be administered under full control and on an immense scale could hardly have produced more satisfactorily differential results.

Before presenting and examining the Saskatoon data, it is of interest to examine some of the recent literature on cold resistance to gain an idea of the amount of reliance to be placed on comparative seedling frost reactions. Martin (5) tested the cold resistance of 12 Pacific Coast spring wheats and found essential agreement between results obtained at the seedling stage and boot stage under both artificial and field conditions. Peltier and Kiesselbach (6), in a study of cold resistance in spring-sown cereals, showed that seedlings in the two and three-leaf stage of development were materially less resistant than seedlings at earlier or later stages of development. Suneson and Peltier (8) reported similarly that "seedlings emerged from 7 to 12 days prior to controlled hardening and freezing,